Service Manual

Elecsys 1010

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Technical Product Management
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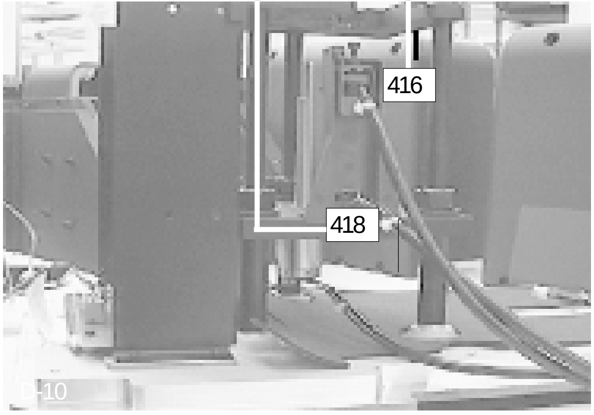
How to Use this Manual

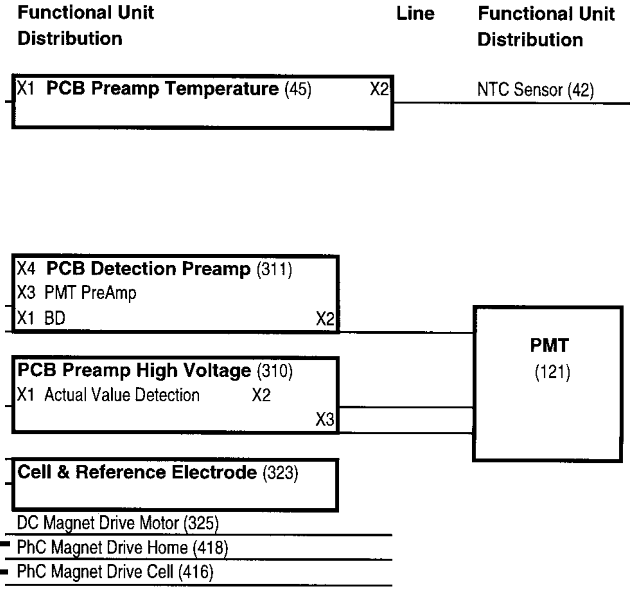
It may occur that identical components occur several times in Elecsys 1010 and perform different functions. Every component has an ID number in the figures.

e.g. ***Photo Coupler Assy, preadjusted (416)***
Photo Coupler Assy, preadjusted (418)



In Chapter 5 Electronics the components are referred to as functional units.

e.g . ***Photo Coupler Magnet Home (418)***
Photo Coupler Magnet Cell (416)


Functional Unit Distribution
Line
Functional Unit Distribution
X1 PCB Preamp Temperature (45) X2
NTC Sensor (42)
X4 PCB Detection Preamp (311)
X3 PMT PreAmp
X1 BD X2
PCB Preamp High Voltage (310)
X1 Actual Value Detection X2
X3
PMT (121)
Cell & Reference Electrode (323)
DC Magnet Drive Motor (325)
PhC Magnet Drive Home (418)
PhC Magnet Drive Cell (416)

In Chapter 4 Mechanics the part name is used. In addition, the information is contained whether the part can be ordered as a spare part ,or if it consists of several components.

e.g. ***Photo Coupler Assy, preadjusted (418)***

Replaceable Components:

- Peltier Assy Preheater (302)
- Preheater Sipper (306)
- PCB Preamp High Voltage (310)

- Holder Photo Coupler MD1 (326) consisting of:
  - Photo Coupler Holder (419)
  - Photo Coupler Holder (327)
  - ***Photo Coupler Assy, preadjusted (418)***

In Chapter 8.2 Part Identification shows where this part is used in Chapter 4 or 5.

e.g. ***Photo Coupler Assy, preadjusted (416)***
Photo Coupler Assy, preadjusted (418)

No	Part Name English	Electronics	Mechanics
412	TUBING SIPPER (2) 0,8		Detection Module
416	***Photo Coupler Assy, preadjusted***	***BP 1***	***Detection Module***
417	Eccentric Ring, 2 pcs		Detection Module
418	***Photo Coupler Assy, preadjusted***	***BP 1***	***Detection Module***
419	Photo Coupler Holder		Detection Module
527	Cable M10		Detection Module

In Chapter 8.3 Spare Parts, components that cannot be ordered individually do not have an ID. The part name is followed by a cross reference to the spare part, in which the component is contained.

e.g. ***Photo Coupler Assy, preadjusted (416)***
Photo Coupler Assy, preadjusted (418)

No	ID	Part Name English	Spare Part	BTO	R	A	ABC
326	1234567890	HOLDER PHOTO COUPLER MD1	X				A
416		***Photo Coupler Assy, preadjusted, Part of 326***					
418		***Photo Coupler Assy, preadjusted, Part of 326***					
419		Photo Coupler Holder, Part of 326					
327		Photo Coupler Holder, Part of 326					

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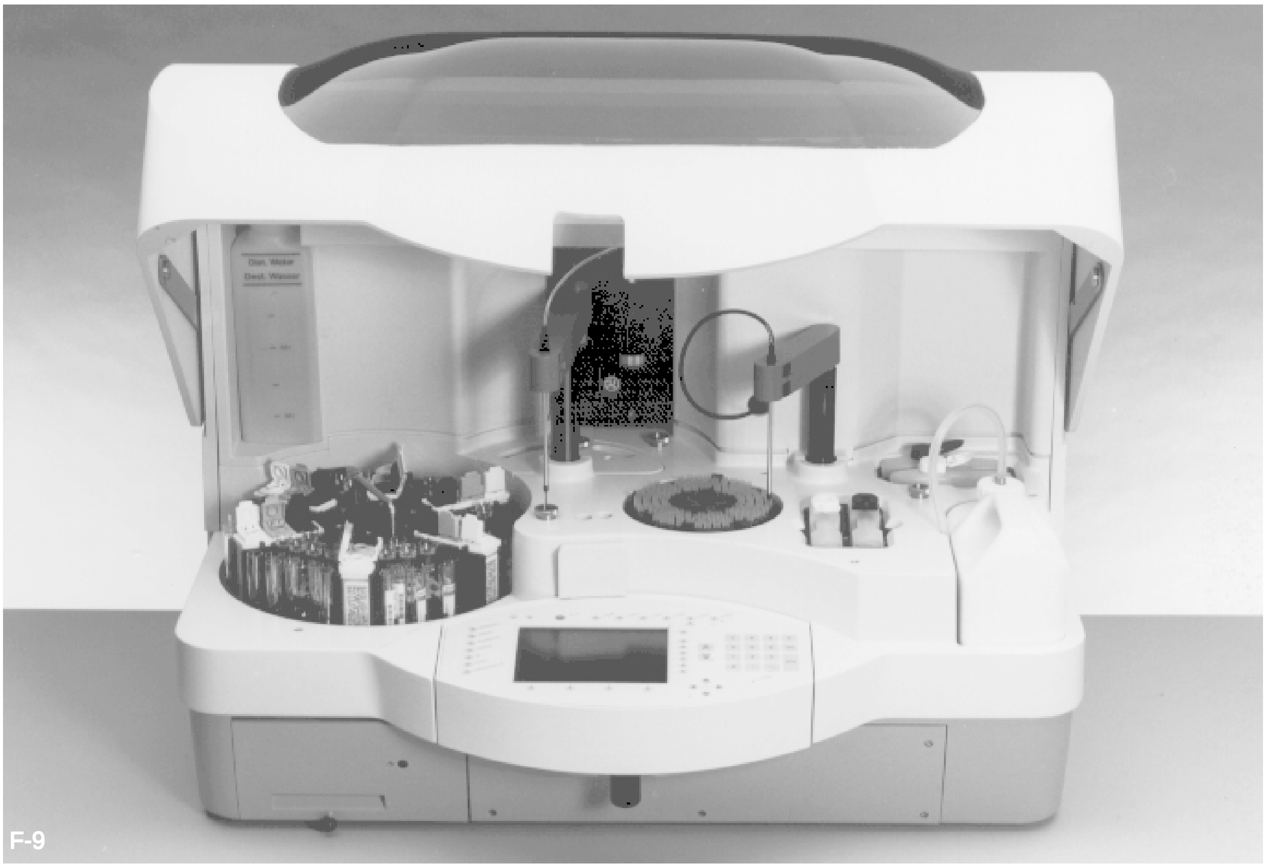
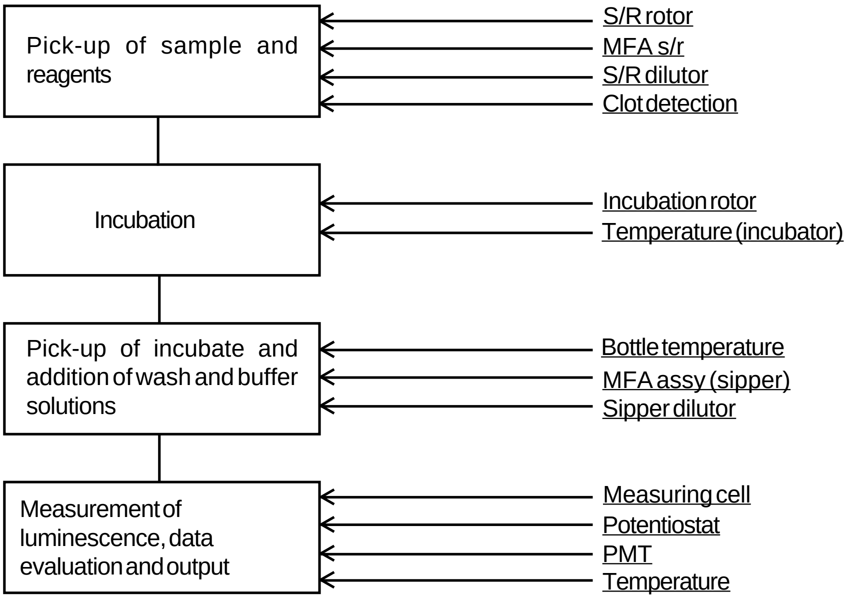
1.1 System Description

1.1.1 Instrument Introduction



F-9

The sequence of operation of Elecsys 1010 is as follows:


Pick-up of sample and reagents
S/R rotor
MFA s/r
S/R dilutor
Clot detection
Incubation
Incubation rotor
Temperature (incubator)
Pick-up of incubate and addition of wash and buffer solutions
Bottle temperature
MFA assy (sipper)
Sipper dilutor
Measurement of luminescence, data evaluation and output
Measuring cell
Potentiostat
PMT
Temperature

Introduction

This System Description explains functions and their interrelationship.

Short Description of the Instrument

The Elecsys 1010 is a Multi-Batch-Analyzer which analyzes immunological tests according to the principle of electro-chemical luminescence (ECL). This measuring system is also called ORIGEN® technology. The emitted photons are measured with a photomultiplier (photon counts).

Elecsys 1010 has all the modules and components necessary for executing the entire analysis including the measurements and evaluation. When operating the instrument (e.g. for test selection and sample placement), the user is guided by menus on the keyboard. Softkeys and function keys can be used for interacting with the instrument. Samples (both in primary tubes and in secondary cups), reagents and calibrators are to be positioned on the sample/ reagent (s/r) rotor. A special reagent bottle combination (RackPack) contains the reagents needed for a test. Each RackPack has a 2-dimensional bar code with all data specific of the test. Positive user identification (PSID) is possible with samples in primary tubes. With samples in secondary cups, patients are identified manually by using the keyboard. After reading the bar code, the RUN is started and performed automatically.

Calibration

At the beginning of a RUN a calibration can be performed. The system imposes a full calibration
- if a new reagent (with a new batch number) is put in.
- at regular time intervals (specific of the reagent)

This is done by calibrators specific of the test (normally 2 levels).

Quality Control

The instrument software contains all programs necessary for the quality control. Data input, management and security is done by using the keyboard.

Instrument Assembly

ELECSYS 1010 is a desk top model and is suitable for a standard laboratory bench. The instrument can be loaded from the front. The instrument cover top must be closed during the RUN.

The instrument is designed to be serviced exclusively from the front, i.e. all components can be taken out and exchanged from the front.

The functional elements (dilutors, rotors, wash stations, bottle temperature assys) have covers that can be easily removed for service. The keyboard is located outside of the closed instrument cover top.

When the instrument cover top is closed, loading of two STAT (short-turn-around-time) samples is possible outside of the direct range of action of the MFA arms and rotors. Pull out the control panel like a drawer, behind which the holder for the above mentioned STAT samples is located. By pushing the control panel back in, the STAT samples are within the direct range of the pipette needle under the closed instrument cover without mechanically or logically interrupting an ongoing process.

Elecsys 1010 has two driving blocks for the sample/ reagent rotor and the incubation rotor.

The sample/reagent rotor is divided into 6 segments. The two outer trays can hold samples in so-called primary tubes of various diameters and heights. Control and calibrator liquids are normally also positioned in these trays. A maximum of 6 RackPacks with 2 reagents and one bead container each are arranged radially between the sample segments. The two inner trays are provided for secondary cups. The labels on the primary tubes on the two outer trays and the RackPacks can be read by a bar-code reader (BCR).

The rotor assy is equipped with toothed disks and LEDs for controlling and checking the rotor functions. The sample/ reagent rotor is removable.

The incubation rotor is an aluminum block heated to 37°C. It can hold 4 identical segments with 32 incubation vessels each. These incubation vessels are small conical plastic tubes that hold the incubation material. When preparing the RUN, the user loads the incubation rotor with the 4 segments. The incubation rotor is not removable.

Detection Module

The ECL measuring cell is located in the detection module. The photomultiplier (PMT), which is shielded from electromagnetic radiation by a special housing, as well as the holder for the pre-amplifier and the high-voltage module are located above the measuring cell. The magnet with the drive for the bead capturing is under the measuring cell. The magnet is moved vertically from below to the bottom of the measuring cell by a motor/spindle unit. This internal assembly is incorporated in a housing, which serves as an optical, electrical and thermal shield. The optimum temperature for the process of ORIGEN® technology is 28°C. Therefore, the temperature of the entire detection module is set at 28°C.

MFA Assys

The MFA assys transport the
a) sample/reagent from the sample/reagent rotor to the incubation vessels and
b) incubation material as well as ProCell and CleanCell to the measuring cell.

The ProCell is a liquid required for generating the ECL signal. CleanCell is an auxiliary liquid used for cleaning the measuring cell and preparing it for the next measurement.

All components involved in the sample/reagent processes are cleaned with system water.

Arms are mounted on the MFAs. The sample arm holds the sample needle and the bead mixer. The sipper arm holds the sipper needle. The LLD electronic system and the contact sensory system (crash detection) are also located in the arms. The assembly of both MFAs is identical except for the arm adapters.

The contact sensory system consists of mechanical and electronic hardware components. It records the contact of the needle and the bead mixer with a solid surface, e.g. the bottom of the container or a closed RackPack.

Rotation and lifting are controlled by toothed disks / vanes and photo couplers. Horizontal and vertical movements are normally performed in succession.

Bottle Temperature

Elecsys 1010 has 2 bottle temperature systems, one for ProCell bottle and one for CleanCell bottle. Bottles are refrigerated to approx. 8°C and will reach the desired temperature of 28°C after approx. 1hr. The actual temperature is controlled by NTC resistors in the housing walls.

Dilutors

Elecsys 1010 has 2 dilutors. These are glass cylinders in which pistons are precisely moved at a defined number of increments. When going down, liquids are aspirated. When going up, an exact amount of liquid is discharged by displacement. The direction of the liquid flow can be controlled by reversing valves at the entrance of the dilutors. The dilutors are moved by stepping motors.

The two dilutors have different functions:

The needle of the s/r dilutor aspirates the sample, reagents and microparticles in a defined sequence. The media are separated from the system liquid (H_2O) by an air bubble. The aspirated material is discharged into the incubation vessels through the sample needle. After the sample/reagent process, the needle is internally cleaned with system water by means of the rinsing pump.

The sipper dilutor is located behind the measuring cell and pulls the incubate, ProCell and CleanCell in a defined sequence through the measuring cell. Then the measurement is performed. After that the needle is internally rinsed with CleanCell. The needle is externally cleaned with system water.

Pumps

The instrument has 4 built-in pumps. The waste pump, a peristaltic pump, pumps the measuring material and system liquids into the waste container. The wash stations are fed by two membrane pumps.
Another membrane pump is located on the back of the s/r dilutor. This pump has the following functions:

1. Fill the s/r system with system water.
2. Rinse s/r tubing and needle after pipetting.

Valves

The flow of system water to the wash stations for bead mixer, s/r needle and sipper needle is controlled by four valves (2-way).
The water discharge from the wash stations is controlled by four valves (3-way).
Various liquid levels in the wash stations are possible by setting the 3-way valves at different positions.
Another valve controls the flow of the measuring material to the measuring cell.

Wash Stations

Elecsys 1010 has four wash stations. There are two wash stations for the s/r needle and one wash station each for the sipper needle and the bead mixer. The wash stations use system water.

LLD

The s/r and the sipper needle have one liquid level detection unit (LLD) each. The s/r-LLD detects samples, reagents, incubate and wash water. The sipper LLD detects incubate, ProCell, CleanCell and wash water.

Clot Detection

On the sample/reagent side, there is a risk of (blood) clot formation in the samples. This can be caused by pollution and/or belated clotting of the samples. Changes in the vacuum profile when picking up the samples are identified as clots by means of a differential pressure converter. The appropriate cleaning steps will be taken.

PMT

The photomultiplier tube (PMT) receives and amplifies the luminescence signal and converts it to an equivalent voltage. The PMT window is located at a defined distance vertically above the cell work electrode. High-voltage power supply is required for amplification.

High-Voltage

High-voltage is used for amplifying the luminescence signal generated in the measuring cell. The control range spans from 500 V to1100 V.

Potentiostat

The potentiostat controls the electrochemical redox process in the cell.

Measuring Cell

The cell has three electrodes: the work electrode (on which the microparticles are deposited), the counter electrode and the reference electrode. For the measurement, a constant voltage is applied between work electrode and counter electrode.

Rotor / Dilutor / MFA Drives

The rotors, dilutor pistons and the MFAs are moved by stepping motors. In order to avoid the loss of steps, the motions are controlled by photo couplers and toothed disks. Moreover, forward/backward motions can be recognized by two photo couplers placed at an angle of 90°.

Temperatures

Elecsys 1010 has 4 systems for setting the temperatures of liquids.

The luminescence liquid is measured at a temperature of 28°C. The temperatures of the incubate picked up by the incubator and the liquids used for the measurements (CleanCell and ProCell) are preset inside the detection module. The immunological reaction occurs at 37°C (incubator temperature).

PC

The PC is a standard PC assembly (CPU 486 DX 2, 66MHz, 8MB RAM) with Roche-owned functions. An 1.44 MB floppy disk drive serves as drive a. The system can be started and reloaded from disk drive a:. A flash-E^{2}PROM serves as a hard disk replacement. The general program and changeable parameters are filed here. The LC display is controlled by the VGA controller.

Keyboard Assy

The keyboard assy consists of the keyboard, the keyboard controller, an acoustic signal transmitter, the LC display and some LEDs. The keys are short-stroke touch contact keys. An additional keyboard can be connected to the bottom side of the keyboard assy by using a 5-pin plug (standard keyboard plug). One non-standard function is a signal transmitter (piezo) that can be activated on several frequencies. The display is a 640 x 480 dot LC display. In order to prevent reflections when reading the display in the keyboard assy drawer, it is possible to incline it.

Printer

Elecsys 1010 has a thermoprinter with a printing width of 640 pixels. This corresponds to the display resolution. An immediate hard copy output is possible.

Power Supply Assy

It is equipped with an input for input voltages of approx. 80 - 260 volts and 50-60 Hz. The fuses are not accessible to the customer and can only be exchanged by service personnel.

Barcode Reader / BCR

A bar-code reader (BCR) is attached to the sample/reagent rotor. It reads and decodes primary sample tubes (on the 1st and 2nd tray on the rotor) and reagent RackPacks whenever the rotor passes the reader and transfers the data to the PC by a built-in RS 232 interface. The reader decodes 2-dimensional (PDF 417) and all standard bar codes.

Software Distribution /Processors

The entire Elecsys 1010 software is distributed over a total of 8 processors. The master board has a 486 processor. The measuring, sipper, temperature, rotor and s/r modules have an 80196 processor. The incubation module and the clot detection are controlled by an 8051derivative. The keyboard assy and the printer have one CPU each.

1.1.2 Principles of the Analysis

See Chapter 5 of the Operator's Manual for details of the test principles used on Elecsys 1010.

1.1.3 Pipetting Scheme

Run

This chapter describes processes going on in different tests, e g. the placement of STAT samples during the run, the automatic rerun and the system preparation after start, as well as system evaluation at the end of a run.

Assay Protocols

There are 24 independent assay protocols used for determining the pipetting scheme of tests. Further protocols (no. 24 to no. 26) are used for checking the instrument.

The assay protocols are stored in the system (max. 64) and can only be modified and/or extended by a software update.

In each test a minimum of four liquids, the sample itself, reagent 1, reagent 2 and the microparticles, are processed. The following abbreviations will be used for the liquids:

MP:	Microparticles
B:	Microparticles (test RackPack, assay RackPack)
R0:	Diluent ("all-purpose diluent", special RackPack)
RM:	Pretreatment solution for IgM or IgG tests (in special RackPack)
PS:	Prereaction solution (pretreatment solution in special RackPack)
Rl:	Reagent 1 (assay RackPack)
R2:	Reagent 2 (assay RackPack)
S:	Undiluted sample/ calibrator/ check
DL:	Diluted sample/ calibrator/ check
D:	Aspiration into the measuring cell and optical detection
i:	Incubation time

The processing of these liquids is determined by the four basic protocols 0 through 3. They define which liquids are processed in which pipetting step. On the basis of the basic protocols, the processing with pretreatment liquids (RO, RM or PS) is defined in the protocols 4 through 23. Read the sequence of pipetting steps within one protocol from left to right. The example **Protocol 9 (dilution with 2 different assays)** shows the following sequence:

1. Aspirate R0 and sample S --> discharge both liquids into the first incubation container.

2. Aspirate R0 and the diluted sample DL from the first incubation vessel --> discharge both liquids into the second incubation vessel.

3. Aspirate microparticles, R1 and the diluted sample DL from the second incubation vessel --> discharge all three liquids into the third incubation vessel.

4. Wait until the incubation time i1 is over.

5. Aspirate R2 --> discharge R2 into the third incubation vessel.
6. Wait until incubation time i2 is over.

7. Measurement.

One step is taken after the other, allowing for the incubation time. The last step is always the measurement.

Assay Protocols

Table

No.	Pipetting Step 0	Inc 0	Pipetting Step 1	Inc 1	Pipetting Step 2	Inc 2	Det.	Main assay	Remarks
0			B R1 R2 S	i1			D	X	
1			B R1 S	i1	R2	i2	D	X	
2			R1 R2 S	i1	B	i2	D	X	
3			R1 S	i1	B R2	i2	D	X	
4	R0 S		B R1 R2 DL	i1			D		
5	R0 S		B R1 DL	i1	R2	i2	D		
6	R0 S		R1 R2 DL	i1	B	i2	D		
7	R0 S		R1 DL	i1	B R2	i2	D		
8	R0-> DL1 R0		B R1 R2 DL	i1			D		
9	R0 S-> DL1 R0		B R1 DL	i1	R2	i2	D		
10	R0 S-> DL1 R0		R1 R2 DL	i1	B	i2	D		
11	R0 S-> DL1 R0		R1 DL	i1	B R2	i2	D		
12	PS S	i0	B R1 R2	i1			D		
13	PS S	i0	B R1	i1	R2	i2	D		
14	PS S	i0	R1 R2	i1	B	i2	D		
15	PS S	i0	R1	i1	B R2	i2	D		
16	RM S	i0	B R1 R2 DL	i1			D		
17	RM S	i0	B R1 DL	i1	R2	i2	D		
18	RM S	i0	R1 R2 DL	i1	B	i2	D		
19	RM S	i0	R1 DL	i1	B R2	i2	D		
20	RM S-> DL1 RM	i0	B R1 R2 DL	i1			D		
21	RM S-> DL1 RM	i0	B R1 DL	i1	R2	i2	D		
22	RM S-> DL1 RM	i0	R1 R2 DL	i1	B	i2	D		
23	RM S-> DL1 RM	i0	R1 DL	i1	B R2	i2	D		
24			R1 R1				D	X	only needed for instrument checks, not part of the RUN
25			R1 R2				D	X	
26			R2 R2				D	X	
27			R1 B	i1			D	X	
28									
29... 63	Reserve								

E-Tab1: Assay Protocols

Pipetting Steps

The processing of the assay protocols is divided into four pipetting steps: pipetting step 0, the so-called pretreatment step, pipetting steps1 and 2, and the measuring step. The pipetting steps are divided into partial steps (e.g. pipette R1). The sequence of the partial steps is (regarding the liquid pick-up by the s/r needle): R1, R2, B, S.

The pipetting steps / partial steps according to the assay protocols are described below. The pick-up sequence during pretreatment is always: reagent before sample (in both steps).

For each pipetting step and/or measuring step, a generally applicable step can be described. Figures 1 to 3 give an overview of these pipetting steps.

Pipetting Step 0

In pipetting step 0 the sample is pretreated. It has one or two increments. In the figure, these increments are called "Block 1 and 2".

- Block 1 is passed through for protocols 4 through 23.
- Block 2 is passed through for protocols 8 through 11 and 20 through 23.

Each block consists of

- aspiration of the separation air bubble
- aspiration of the pretreatment liquid from the sample rotor
- washing in wash station 1
- aspiration of the sample
- washing and rinsing in wash station 1 or rinsing in wash station 2, rehomogenizing of the microparticles and washing

Rinsing and washing in wash station 2 with simultaneous rehomogenizing of the microparticles can only be performed one time, always at the end of a pipetting step.

The difference between block 1 and block 2 is the aspiration of the diluted sample from the incubation rotor.

- In block 1, the sample is aspirated from the sample rotor, and the samples are discharged into the first incubation vessel.
- In block 2, the sample is aspirated from the first incubation vessel, and the liquids are discharged into the second incubation vessel.

Pipetting Step 0

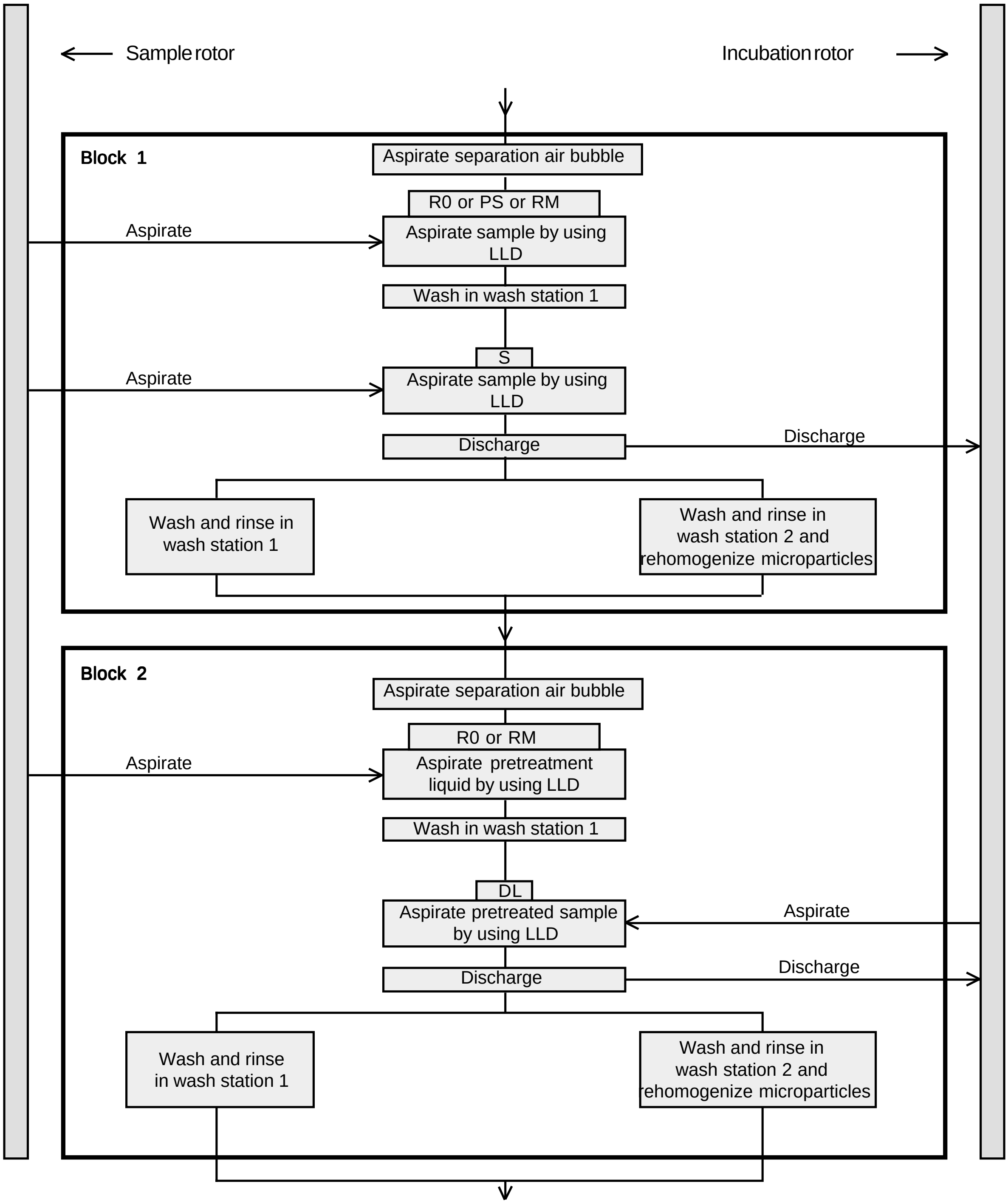

Sample rotor
Incubation rotor
Block 1
Aspirate separation air bubble
R0 or PS or RM
Aspirate
Aspirate sample by using LLD
Wash in wash station 1
S
Aspirate
Aspirate sample by using LLD
Discharge
Discharge
Wash and rinse in wash station 1
Wash and rinse in wash station 2 and rehomogenize microparticles
Block 2
Aspirate separation air bubble
R0 or RM
Aspirate
Aspirate pretreatment liquid by using LLD
Wash in wash station 1
DL
Aspirate pretreated sample by using LLD
Aspirate
Discharge
Discharge
Wash and rinse in wash station 1
Wash and rinse in wash station 2 and rehomogenize microparticles

Figure 1: Pipetting step 0

Pipetting Step 1

Pipetting step 1 is also divided into blocks and always starts with block 1.

- Aspirate the separation air bubble.

In blocks 2, 3 and 4, reagents are aspirated. All three blocks are passed through in the following sequence:

- Aspiration of R1, R2 or microparticles.
- Discharging of fluids after the last reagent has been picked up and the sample pretreated with PS. The sample pretreated with PS will be further processed in block 6.
- Washing in wash station 1.

The assay protocols determine which and how many of the blocks will be passed through in pipetting step 1.

In block 5, the sample is aspirated. The pretreated sample DL is

- aspirated from the first incubation vessel and is discharged into a second incubation vessel in block 6, if it has been pretreated with R0 or RM in one increment (see pipetting step 0).
- aspirated from the second incubation vessel and is discharged into a third incubation vessel in block 6, if it has been pretreated with R0 or RM in two increments (see pipetting step 0).

If sample S has not been pretreated, it will be aspirated from the sample rotor and discharged into the first incubation vessel in block 6.

In block 6, the liquids are discharged into the incubation rotor, and the s/r needle is washed and rinsed. If the sample has been pretreated with PS, the aspirated liquids will be added to the first incubation vessel (see pipetting step 0).
The rehomogenizing of the microparticles and the washing /rinsing in wash station 2 will be performed if in the next cycle microparticles are pipetted in one pipetting step 1.

Pipetting Step 1

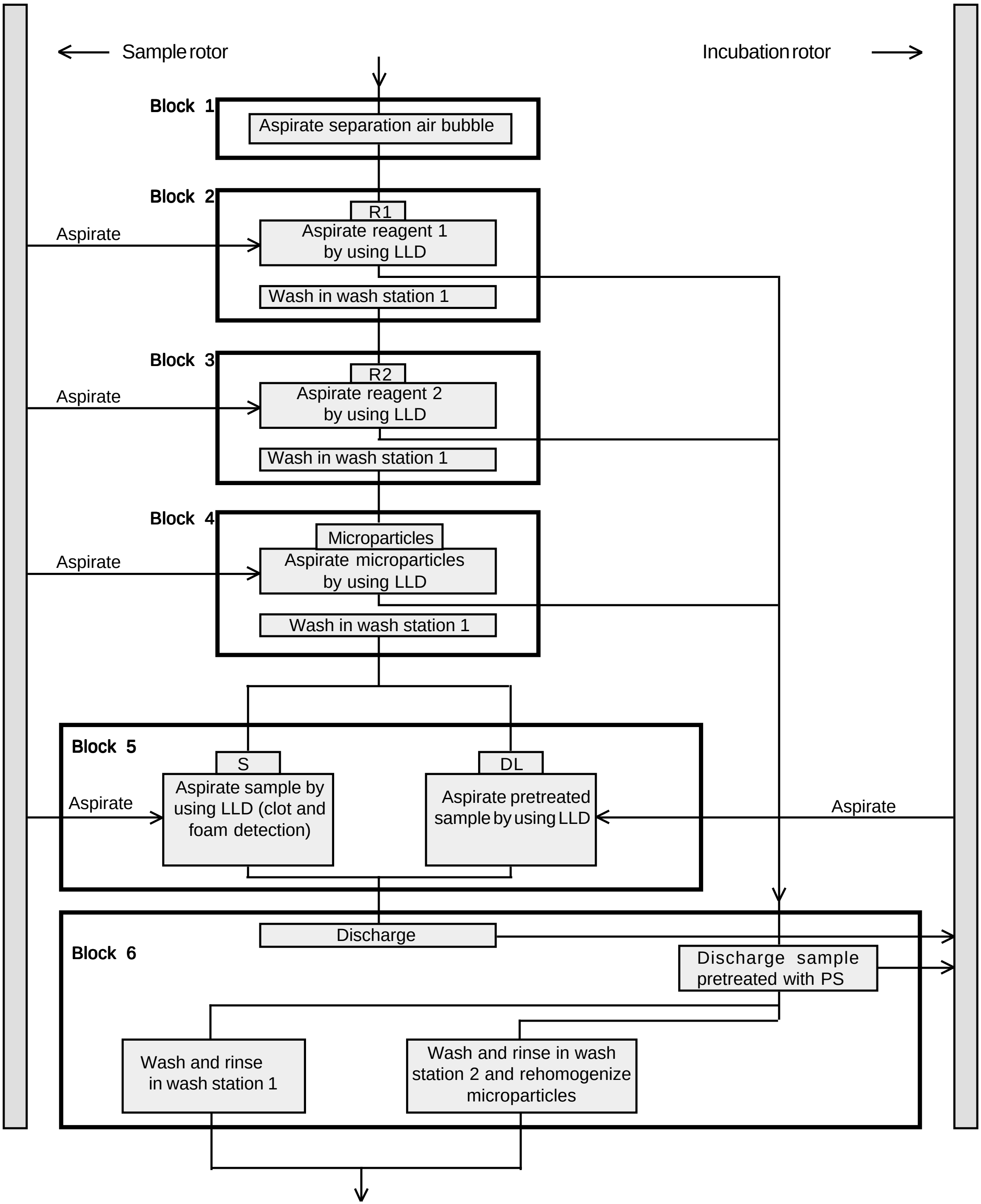

Sample rotor
Incubation rotor
Block 1
Aspirate separation air bubble
Block 2
R1
Aspirate
Aspirate reagent 1 by using LLD
Wash in wash station 1
Block 3
R2
Aspirate
Aspirate reagent 2 by using LLD
Wash in wash station 1
Block 4
Microparticles
Aspirate
Aspirate microparticles by using LLD
Wash in wash station 1
Block 5
S
DL
Aspirate
Aspirate sample by using LLD (clot and foam detection)
Aspirate pretreated sample by using LLD
Aspirate
Block 6
Discharge
Discharge sample pretreated with PS
Wash and rinse in wash station 1
Wash and rinse in wash station 2 and rehomogenize microparticles

Figure 2: Pipetting step 1

Pipetting Step 2

Pipetting step 2 is divided into 4 blocks. Like pipetting step 1, it always starts with block 1:

- Aspirate the separation air bubble.

In blocks 2 and 3, reagents are aspirated. Both blocks are passed through in the following sequence:

- Aspirate R2 or microparticles.
- Discharge liquid into the incubation rotor after the last reagent has been picked up.
- Wash in wash station 1.

The assay protocols determine which and how many of the blocks will be passed through in pipetting step 2.

In block 4, the liquids are discharged into the incubation rotor, and the s/r needle is washed and rinsed. The liquids will be

- added to the first incubation vessel, if the sample has not been pretreated or pretreated with PS.
- added to the second incubation vessel, if the sample has been pretreated with R0 or RM in one increment.
- added to the third incubation vessel, if the sample has been pretreated with R0 or RM in two increments.

The rehomogenizing of the microparticles and the washing /rinsing in wash station 2 will be performed if in the next cycle microparticles are pipetted in one pipetting step 1.

Pipetting Step 2

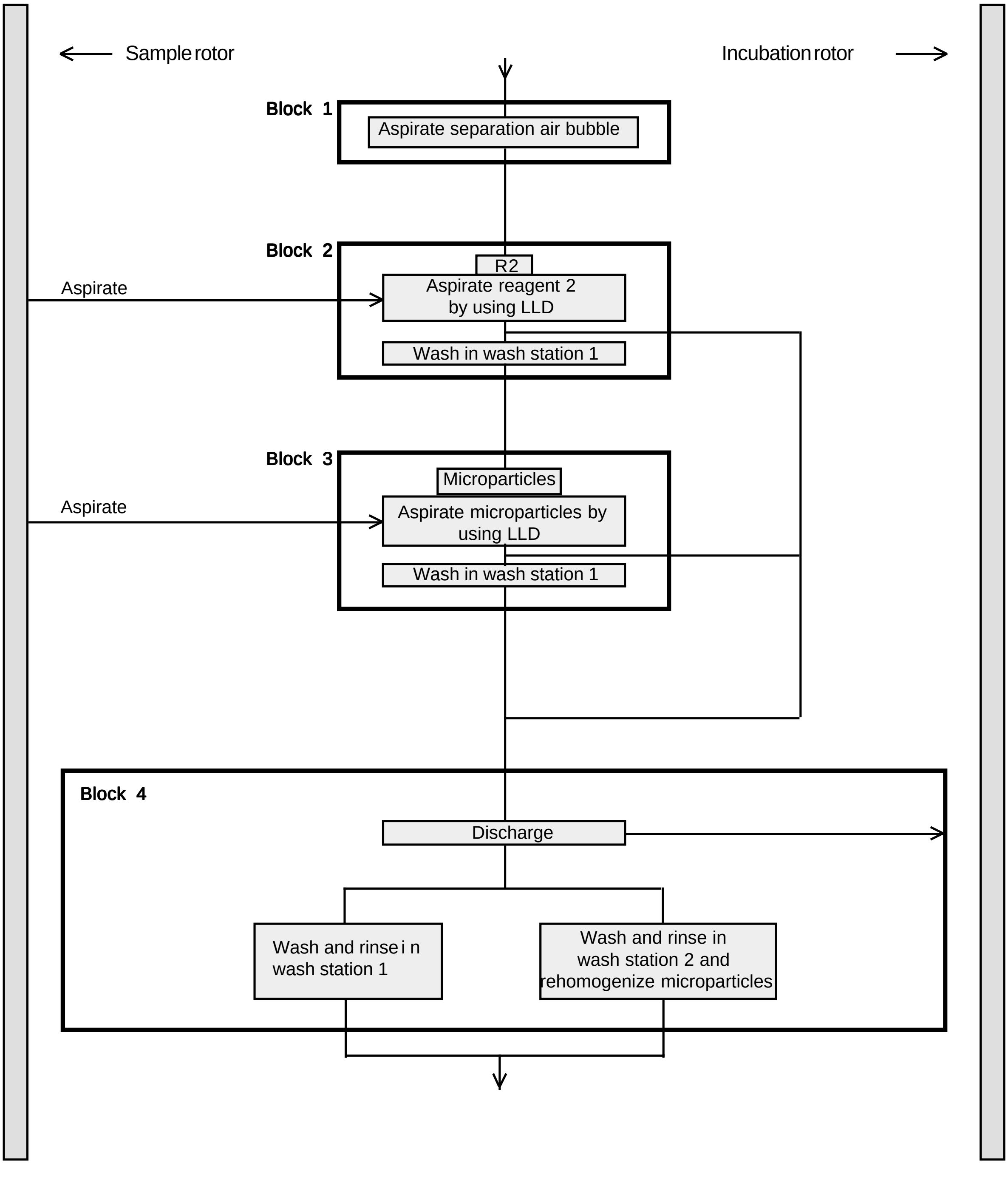

Sample rotor
Incubation rotor
Block 1
Aspirate separation air bubble
Block 2
R2
Aspirate
Aspirate reagent 2 by using LLD
Wash in wash station 1
Block 3
Microparticles
Aspirate
Aspirate microparticles by using LLD
Wash in wash station 1
Block 4
Discharge
Wash and rinse in wash station 1
Wash and rinse in wash station 2 and rehomogenize microparticles

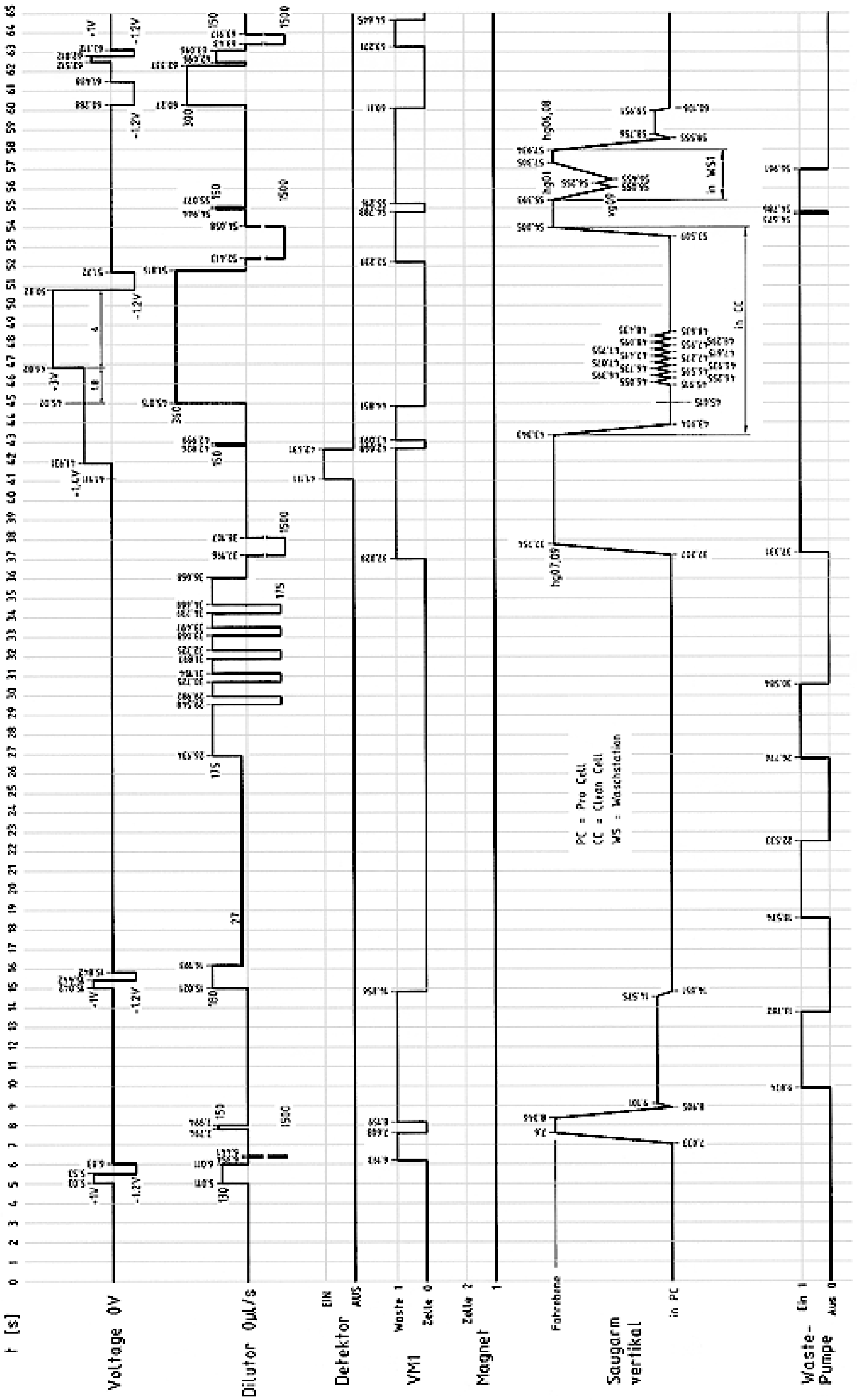
Figure 3: Pipetting step 2

Measuring Step

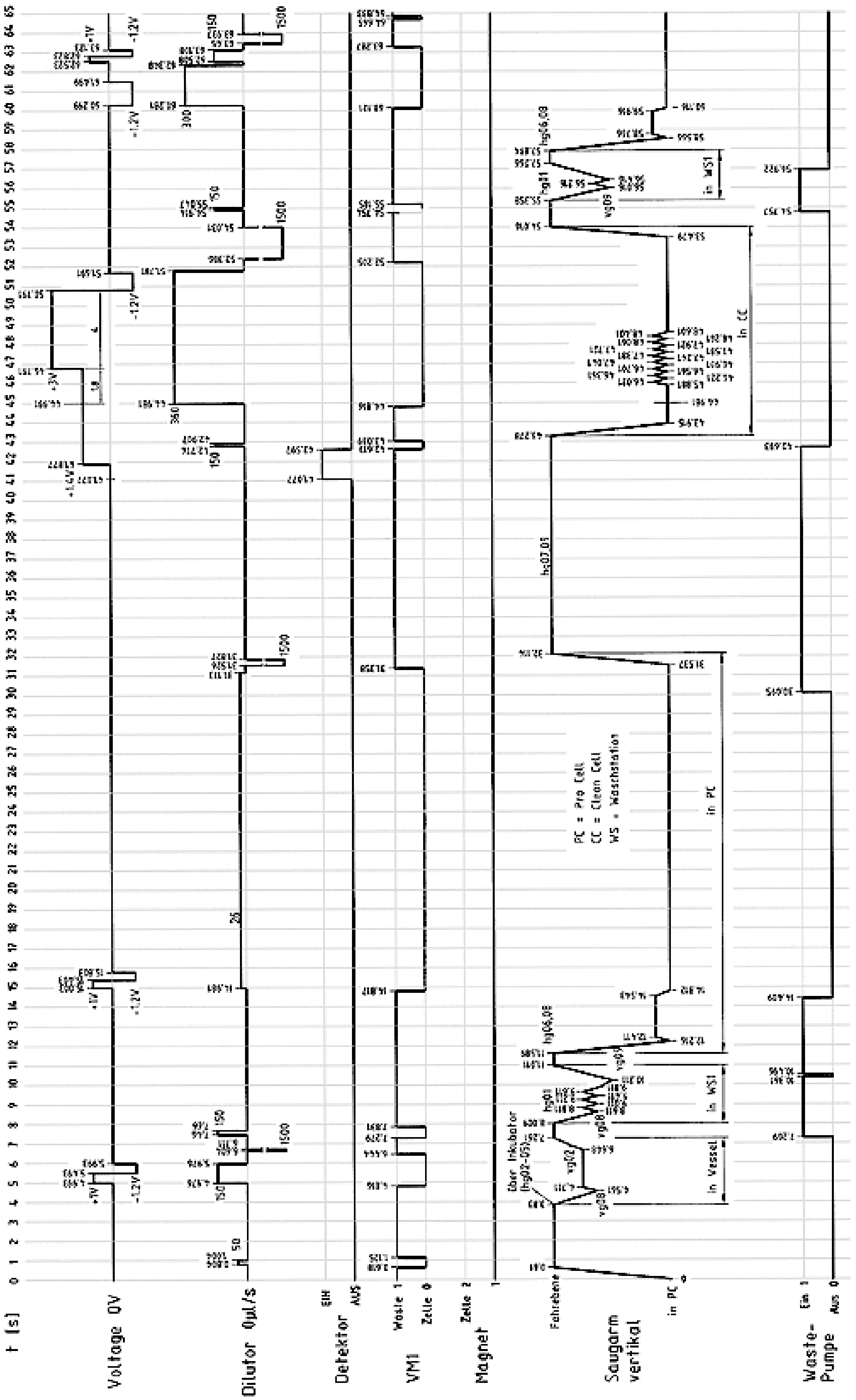
Measuring step actions take place around the measuring cell, e.g. in the incubator, sipper needle, measuring cell or in the sipper system dilutor. The measuring step has the following increments:

- Pick-up of the incubate (- sampling, pick -up) (pre-conditioning with ProCell included).
- Transport of the incubate with ProCell (pre-conditioning with ProCell included).
- Capturing with ProCell
- Washing with ProCell
- Measuring -> optical measurement
- Pick-up of CleanCell solution for cleaning 1
- Pick-up of air and CleanCell alternately
- Solution for cleaning 2
- Pick-up of ProCell for cleaning 3
- Pick-up of ProCell for post -conditioning

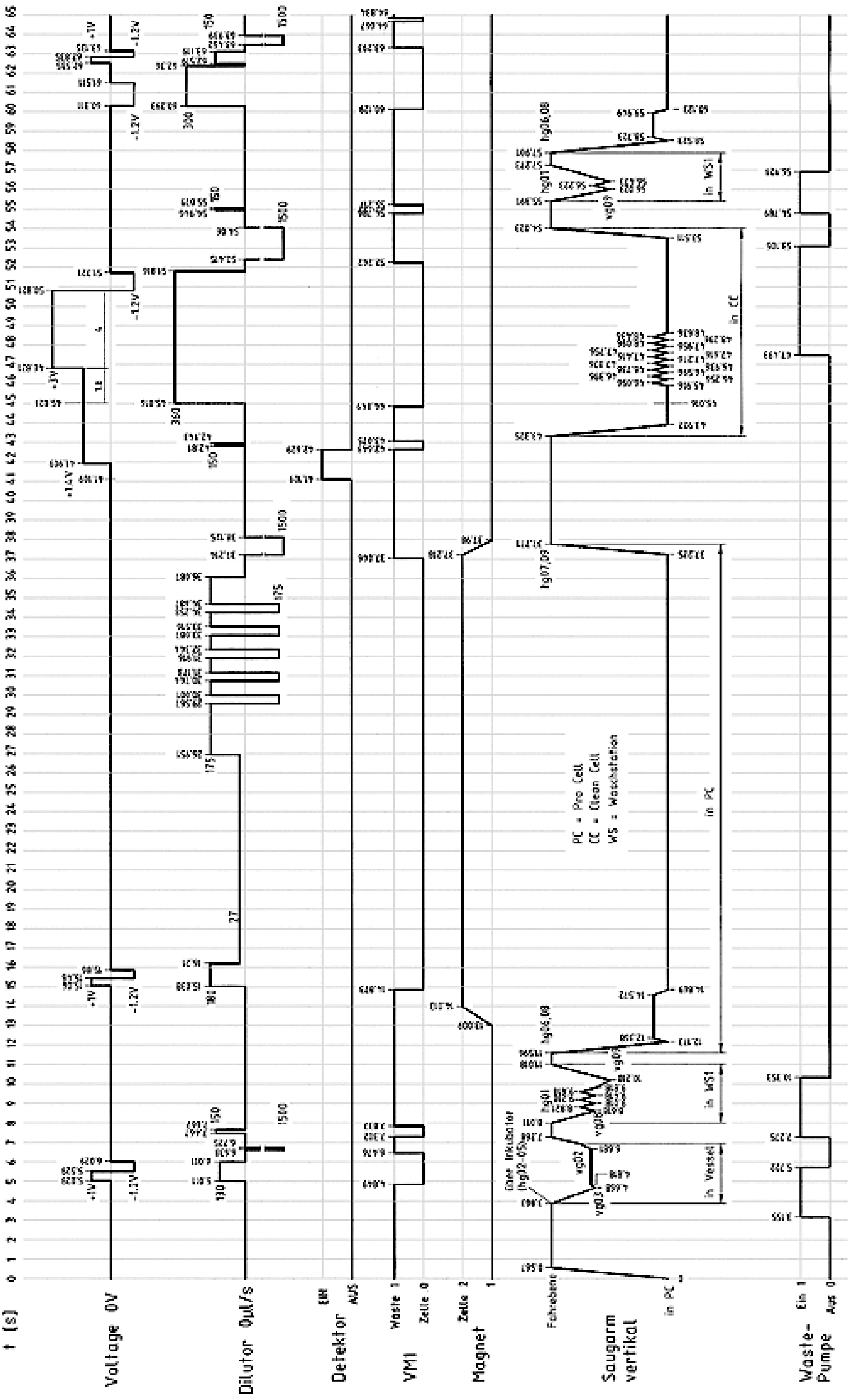
1.1.3.1 Timing Diagram



diag1.tif


t [s]
Voltage 0V
Dilutor 0µl/s
Detektor
EIN
AUS
VM1
Waste 1
Zelle 0
Zelle 2
Magnet
1
Saugarm vertikal
Fahrebene
in PC
Waste-Pumpe
Ein 1
Aus 0
PC = Pro Cell
CC = Clean Cell
WS = Waschstation
in Vessel
in WS1
in PC
in CC
über Inkubator (hg02-05)
-1.2V
+1V
1500
150
300
380
hg07.01
hg06.08

diag2.tif


t (s)
Voltage 0V
+1V
-1.2V
+1.4V
-3V
Dilutor 0µl/s
Detektor
EIN
AUS
VMI
Waste 1
Zelle 0
Magnet
Zelle 2
1
Saugarm vertikal
Fahrebene
in PC
Waste-Pumpe
Ein 1
Aus 0
PC = Pro Cell
CC = Clean Cell
WS = Waschstation
in PC
in CC
in WS1
in Vessel
über Inkubator (hg12-65)
hg26,08
hg07,09
hg01
vg01
vg02
vg03

diag3.tif

1.2 System Specification

Analyzer dimensions	Height:	620 (mm)
	Depth:	780 (mm)
	Width:	960 (mm)
	Weight	approx. 110 (kg)
Electrical	Supply voltage	100 - 240 (V) AC at 50/60 (Hz)
	Power consumption	max 0.61 (kVA)
	Fuse circuit	16 (A) time-lag at 230 (V) AC
	Heat generation	approx. 2000 (kJ/h) resp. 481 (kcal/h) resp. 1912 (BTU/h)
Environmental conditions	Temperature	18 (°C) to 32 (°C)
	Ambient temperature note change during one batch run	max. ± 3 (°C)
	rel. humidity	20 (%) to 85 (%) without condensation
Noise level according to DIN 43635	Continuous operation	max. 60 (dBA)
	Peak level	max. 65 (dBA)
Water supply	Water tank	approx. 4,2 (l)
	Water quality (conductivity)	sub-micron filtered <10 µS/cm
	Water consumption	approx. 3 (l) for 128 test
Waste water connection	Waste container for measuring material, system water, ProCell, CleanCell	approx. 5 (l)
Throughput	ECL measurements	approx. 50 (tests/h)
Samples	Sample volume per test	10 (µl) to 50 (µl)
	Sample detection	by Liquid Level Sensor and Clot Detector of the sample / reagent needle
	Sample rotor for routine samples, calibrators and controls	42 positions for primary tubes, 18 positions for secondary cups
		2 positions for STAT samples
	Usable sample bar codes	NW7 (Codabar), Code 39, Code 128, Interleave 2 of 5
Reagent	Reagent capacity	6 reagent channels
	Reagent detection	by Liquid Level Sensor of the sample/ reagent needle

E-Tab2

	Bottle volume for CleanCell and ProCell	380 (ml)
	Reagent ID	by 2-dim. bar code (PDF 417)
Incubator	Incubator capacity	128 plastic assay cups (4 x 32)
	Volume of assay cups	200 (µl)
	Incubation temperature	ambient temperature 18°C to 20°C 37°C + 0.3°C - 0.8°C ambient temperature 20°C to 32°C 37°C + 0.3°C - 0.3°C
	Incubation time	9 / 18 (min)
Measuring system	Measuring method	Integral measurement of luminescence signal
	Calibration method	2 point calibration
PC	Disk drive	Floppy disk 3,5" / 1.44 MB
	Interfaces	1 Centronics for printer, 1 RS 232 for laboratory EDP
	LCD	Black-and-white VGA LCD with 640 x 480 pixels
	Thermoprinter	Paper width 110 (mm)

E-Tab3

1.3 Operator Precautions and Hazards

The data and information provided in this manual correspond to the state of knowledge existing at the time of introducing the Elecsys 1010 onto the market. Any important changes will be taken into account in the next edition of this manual.

The respective packaging leaflet should be regarded as authoritative.

This service manual was created for the telephone and technical service staff.

1.3.1 Contact Persons

Technical Product Management and Support

Department: LI-TT

Phone:	0621 / 759 /	3227 8802
Fax No:	0621/ 759 /	4591

Logistics Hotline (RA):

Phone:	0621 / 759 /	4389
Fax No.:	0621 / 759 /	4613 8093

When calling from abroad, drop the "0" and add the country code (+ 49).

1.3.2 Proved Security

This instrument has been constructed according to the regulations of DIN IEC 601, part: "Security of Electromedical Instruments: General Guidelines" and left our factory in perfect condition regarding work safety.

The instrument obtained the GS mark for proved security from the TÜV.

In order to ensure safe operation the user must follow the instructions and warnings given in the instruction manual.

This instruments meets protection 1 (earth conductor wire).

1.3.3 Precautions and Hazards

All electrical equipment is potentially hazardous. Never remove covers without first ensuring that it is isolated from the AC supply, unless specific maintenance instructions or repairs are being carried out by authorized Roche Diagnostics personnel.

The hard- and software is subject to a program of continuous evaluation and improvement and, therefore, may be changed in the future. This also concerns service requirements.

All samples and reagents should be treated with caution accorded to those known to contain pathogenic organisms. Similarly, the cleaning of component part of Elecsys 1010 should be done with respect to human health.

Warning:

All components used on Elecsys 1010 must be regarded as potentially dangerously contaminated when doing repair work. Use rubber gloves or double gloves whenever cleaning or sterilizing components. the most frequently used components (tubings, cuvette, measuring chamber flap, sip. lever and waste container) should be cleaned and treated with a suitable disinfecting solution (75% alcohol) prior to doing any service work.

Disinfect and wash hands after work is completed.

This instrument has been constructed and checked in accordance with Standards IEC 1010. When the instrument leaves our factory it is in perfect order from the point of view of work safety. To keep it that way and to ensure safe operation the user must follow the instructions and warnings given in the operation instruction manual.

The electrical protection of the apparatus to Class I (it has a protective earth).

The power plug must only be inserted into a socket that has a protective contact. The protection must not be abolished by using an extension lead that does not have a protective earth wire.

Warning:

Any break in the earth wire inside or outside the apparatus and any loose connection of the earth wire can make the operation of the apparatus dangerous. A deliberate break or interruption is not allowed.

When the housing is opened or components are being removed (except when this can be done by hand), live parts may be exposed. Connection may also be live.

Therefore, if the carrying out of an adjustment, service or repair on the open apparatus in the live state is unavoidable, this must be done by an expert who is familiar with the dangers involved.

Make sure you only use fuses of the specified type and rated amperage when replacing. Repaired fuses must not be used and the fuse holder must not be bypassed.

If you have any reason to believe that the instrument can no longer operate safely, take it out of use and make sure no one can use it accidentally.

It must be assumed that safe operation is no longer possible when the instrument:

- shows visible signs of damage
- fails to operate
- has been stored under unfavourable conditions for a fairly long time
- has been transported under rough conditions

The Elecsys 1010 should be used by appropriately qualified persons only.

Warning:

In order to avoid electrostatic charging when working on the electronics, use a grounding strap and a grounding mat.

For more information, please refer to operator manual.

1.4 Service Concept

1.4.1 Service Level

From the early stage of development, Elecsys 1010 was designed for simple error detection and easy exchangeability of modules. This gives the service workshops the possibility of a fast and easy repair of the instrument on service level A (module level). No big stock or expensive equipment is necessary and service technicians are easier to train. Also, a permanent technical improvement in layout and components took and takes place for better productivity and economic production.

On repairable modules the quality and function is always provided by the manufacturer according to the latest technology. This keeps Elecsys 1010 always on the highest quality level.

The exchange price for modules will be kept on a low level to guarantee repairs, on an economical basis.

1.4.2 RA-Procedure (Replacement of defective parts)

Warranty period for instruments and spare parts

The warranty period for instruments is 16 months starting with the date of shipment ex works Mannheim/Federal Republic of Germany or 12 months starting with the date of the first installation, whichever period is shorter.
The warranty period for spare parts is 6 months from installation date of the part, however not longer than 24 months after having delivered ex works Mannheim/Federal Republic of Germany. Note: In case the instrument has a remaining warranty period of more than 6 months, the parts remain under warranty until the warranty period of the instrument expires.

Handling of warranty claims

The warranty claim has to be handled via Return Authorization procedure or accepted equivalent. Please answer all the questions on the RA form with the greatest care.Especially a detailed fault description is needed or the warranty claim will not be accepted by the manufacturer. Complete instruments are not accepted unless this has been agreed with the service department of the relevant product group responsible at RD GmbH.

Important information

- Only parts marked with "A" in the price list are generally accepted under warranty.
- Only return those parts marked with "R" in the spare parts price list.
- Warranty claim for „R“ parts will be accepted, if the part was returned to Mannheim.
- All defective parts (non-"R" and "A" parts) should be kept on stock for a period of 7 months. In case the manufacturer needs the part for investigation it will be requested from Mannheim.
- All parts returned to Mannheim and not requested by Mannheim will be send back at the expense of the countries.
- The RA claim for warranty has to be in Mannheim no later than 8 weeks after the problem date.

Exclusion of warranty

The aforementioned warranties do not apply in case of improper use, handling, transportation or storage, faulty installation, repair or maintenance, chemical influence or contamination as well as damages resulting from that, failure to follow operating instructions, alterations or modifications of instruments or parts thereof not authorized or recommended by RD GmbH and resulting damages, normal wear and tear and in case of other circumstances beyond the control of RD GmbH.

Handling of repairs

As a general rule, all instrument repairs should be carried out by authorized and trained personnel only.

Repair of parts marked with "R"

Parts which are economically worth repairing are marked with "R" in the spare parts price list. New and repaired parts could be recognized by different material numbers (language version).

(e.g. new part: 1234567-001, repaired part: 1234567-984)

Repaired parts should be ordered together with new parts via the order processing department in Mannheim (OU-VDG). Parallel to the ordering process of a repaired part, the defective part should be returned together with the filled RA form (giving full details of the defect and marked choice box with repair) to Logistic Instruments (Goods Receipt) in MA-Wohlgelegen (LI-GS). Repair of instrumentsComplete instruments are not accepted for replacement or repair unless this has been agreed with the product group responsible at RD GmbH. Before replacement or repair can take place, the validity of the request must be examined and the question of costs must be settled in a written agreement with RD GmbH.

Terms of delivery

Shipments to the countries with the routine truck are c.i.f./ shipments outside this procedure are ex works Mannheim. Emergency shipments require additional costs to be charged.

Handling of costs

„Repaired"-parts (Material-No. 1234567-984) are shipped at a repair price. In case the defective parts are not returned within 3 or 8 weeks for european or oversea countries after ordering the repaired part, the countries will be charged later on with the difference to the new price.After the receipt of a warranty request for „A"-parts, RDG will credit 100 % of the currently effective ex MA price.In case the manufacturer does not accept the warranty request, the countries will be charged lateron with the R-price for R-parts and the new price for non R-parts.

RA form

Return Authorization. Please answer all the questions on the RA form with the greatest care and sign the form.

- Country code
- Problem date
- Type of instrument
- Serial no. of the instrument
- Installation date of instrument
- Defective instrument or spare part
- Part number and material number of the spare part
- Old / new serial no.
- Fault description
- Alarm code
- Service / workshop report no.

In case of instrument out of warranty

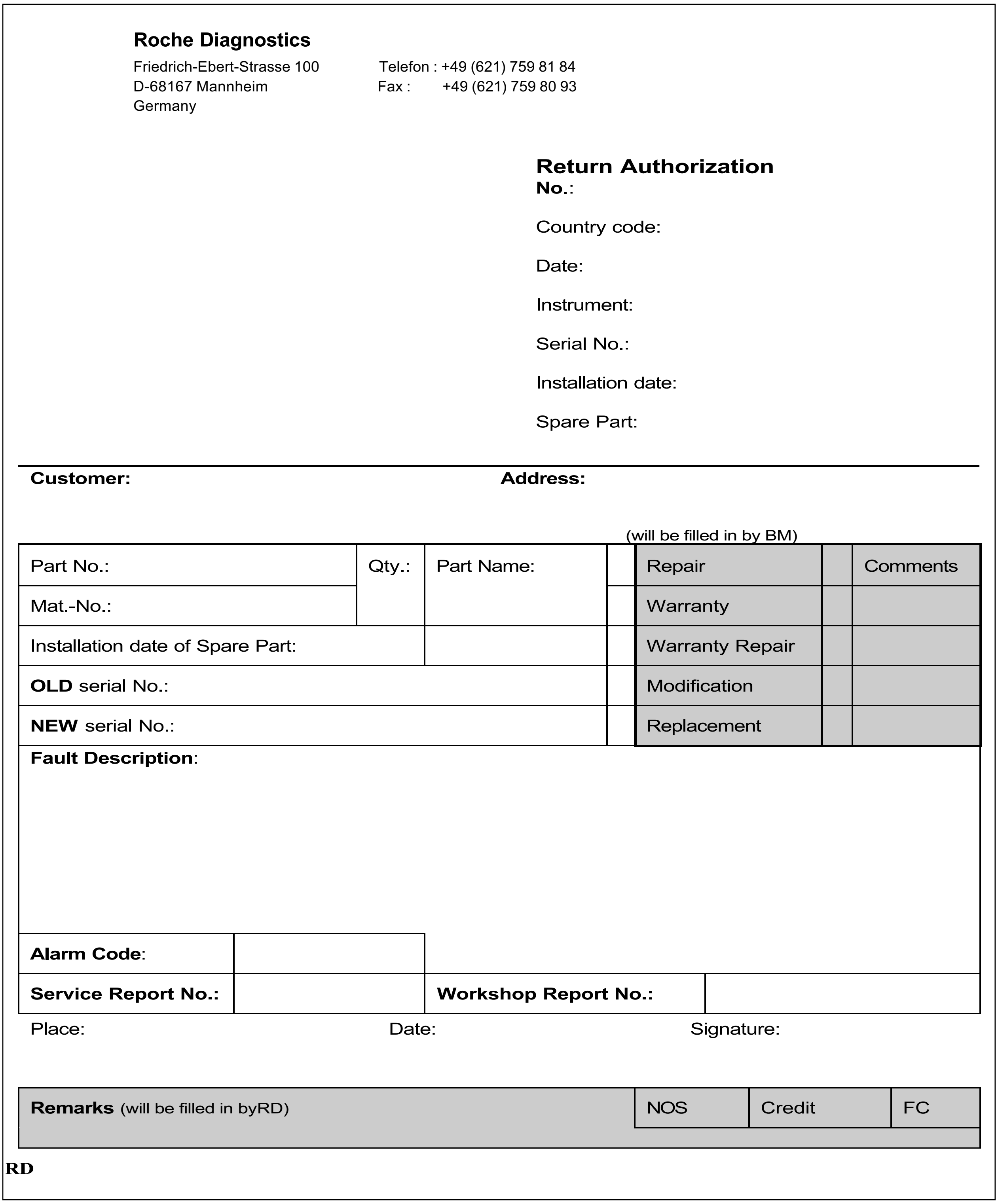
- Installation date of spare part.

All returned parts should be individually labeled with the corresponding RA No. and shipped together with the completed RA form to:

Roche Diagnostics GmbH
Logistic Instruments
RA Management
Friedrich Ebert Str. 100
D - 68167 Mannheim
Germany

RA Form:

A copy of the RA Form is shown below.



Roche Diagnostics

Friedrich-Ebert-Strasse 100
D-68167 Mannheim
Germany

Telefon : +49 (621) 759 81 84
Fax : +49 (621) 759 80 93

Return Authorization No.:

Country code:

Date:

Instrument:

Serial No.:

Installation date:

Spare Part:

Customer: **Address:**

(will be filled in by BM)

Part No.:	Qty.:	Part Name:		Repair		Comments
Mat.-No.:				Warranty		
Installation date of Spare Part:				Warranty Repair		
OLD serial No.:				Modification		
NEW serial No.:				Replacement		

Fault Description:

Alarm Code:			
Service Report No.:		**Workshop Report No.:**	

Place: Date: Signature:

Remarks (will be filled in byRD)	NOS	Credit	FC

RD

Fig.: RA.eps

10 Maintenance

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10 Maintenance

10.1 Introduction

WARNING

Before maintenance procedures are performed on the analyzer, refer to the warnings in Section 1.4, Potential Hazard and Safety Precautions, of the Reference Guide.

All analyzer components that can come in contact with biological substances are potentially biohazardous and can endanger the health of an operator. Therefore, only perform care and maintenance procedures according to national, international and general laboratory safety regulations.

Analyzer care entails all procedures that are periodically performed by the operator. These procedures, listed below, serve to ensure a problem-free run and thus the correct operation of the Elecsys 1010 analyzer. Refer to the maintenance schedule on the next page. The correct operation of the analyzer can only be ensured when the maintenance procedures are performed periodically. Regular care and maintenance avoids analyzer downtimes, failures, and measurement and run problems.

10.1.1 Cleaning Materials

The following materials are generally required for care and maintenance procedures:

- Alcohol (70% isopropyl alcohol)
- Normal common disinfectant
- Distilled/deionized water
- Rubber gloves
- 0.5 % Edisonite® (to clean sampling system)
- Cleaning brush
- Cleaning solution (SysClean)
- Cloths (clean, lint-free, absorbent)
- Ultrasonic bath (if available; use only when the rinse stations and probes are highly contaminated; 15 minutes with distilled water, 25000 Hz, at 60 °C)

10.2 Maintenance Schedule

Detailed descriptions of the maintenance procedures listed below can be found later in this chapter.

Daily

None

Bi-weekly

Perform SYSTEM CLEANING INTENSIVE
Clean the microparticle mixer
Clean the sipper probe
Clean the S/R probe
Perform CELL CLEANING NORMAL

As required

Clean the analyzer surfaces and cover
Replace printer paper
Clean the rinse stations

RD Service only

Perform CELL CLEANING INTENSIVE

10.3 Bi-weekly Analyzer Maintenance

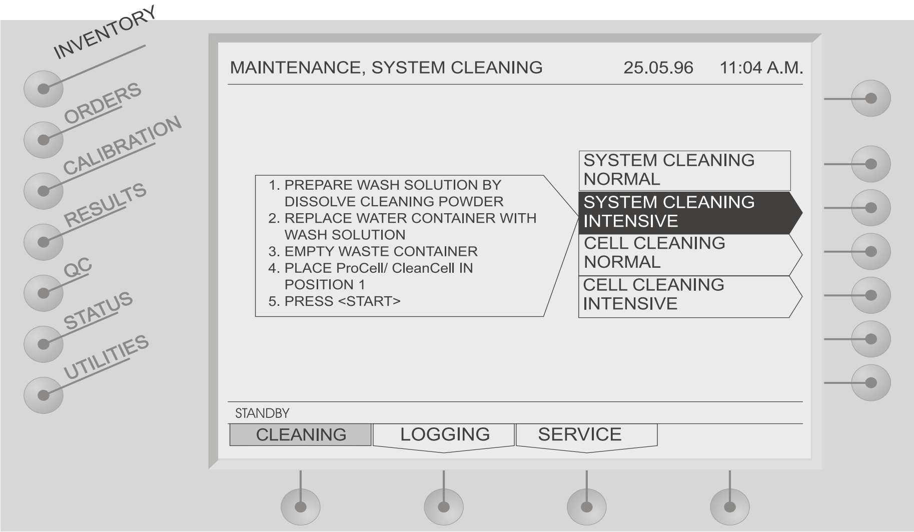
10.3.1 Perform SYSTEM CLEANING INTENSIVE

Perform the SYSTEM CLEANING INTENSIVE function to prevent deposits and bacterial contamination. The analyzer displays a message when a maintenance procedure is required. This function should be performed on a bi-weekly basis.

Note
The frequency with which the cleaning function is performed is dependent on the test throughput and can be set thus allowing longer maintenance intervals to be defined.

Safety Precautions
None.

Materials Necessary
Edisonite.



MAINTENANCE, SYSTEM CLEANING 25.05.96 11:04 A.M.

1. PREPARE WASH SOLUTION BY DISSOLVE CLEANING POWDER
2. REPLACE WATER CONTAINER WITH WASH SOLUTION
3. EMPTY WASTE CONTAINER
4. PLACE ProCell/ CleanCell IN POSITION 1
5. PRESS <START>

STANDBY

INVENTORY
ORDERS
CALIBRATION
RESULTS
QC
STATUS
UTILITIES
SYSTEM CLEANING NORMAL
SYSTEM CLEANING INTENSIVE
CELL CLEANING NORMAL
CELL CLEANING INTENSIVE
CLEANING
LOGGING
SERVICE

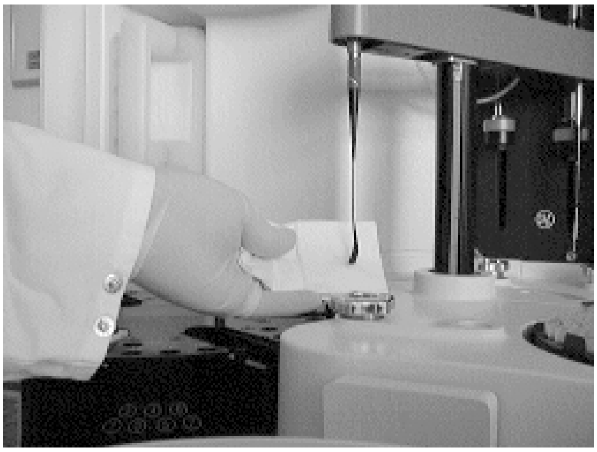
1. Press the UTILITIES key and then the MAINTENANCE key. The MAINTENANCE, SYSTEM CLEANING screen is displayed.
2. Press the SYSTEM CLEANING INTENSIVE key and follow the instructions displayed on screen.
3. When all requirements that are displayed on screen have been fulfilled, press the START key. Elecsys 1010 starts the cleaning process and displays the time remaining until the cleaning process is complete. After half of the necessary time of the cleaning process you have to empty the waste container and clean it with distilled water. Press PAUSE (at the bottom right of the screen) to interrupt the cleaning process. The process can be continued by pressing CONTINUE (same key).
4. Elecsys 1010 displays a message when the cleaning process is complete.
   SYSTEM CLEANING INTENSIVE is now complete.

10.3.2 Clean the Microparticle Mixer

Wipe the microparticle mixer clean every second week to remove any contamination. Do not bend the microparticle mixer.

Safety Precautions
The analyzer must be switched off. Ensure that the normal laboratory safety precautions are heeded and wear rubber gloves.

Materials Necessary
Absorbent, lint-free cloth and alcohol.



1. Power off the analyzer. Gently raise the S/R arm up and out of rinse well.
2. Rotate the sample/reagent arm manually so that the microparticle mixer can be easily accessed.
3. Clean the mixer with a lint-free cloth soaked in alcohol.

⚠ **CAUTION**
Handle the microparticle mixer with care. Do not bend. A bent mixer can cause analyzer errors.

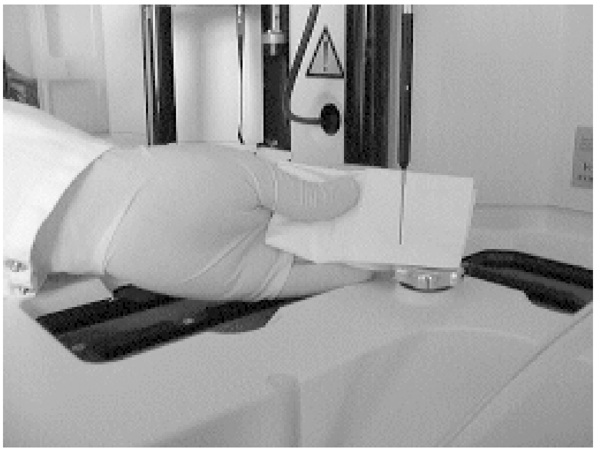
10.3.3 Clean the Sipper Probe

Wipe the sipper probe clean every second week to remove any contamination.

Safety Precautions
The analyzer must be switched off. The sipper probe is potentially biohazardous. Ensure that the normal laboratory safety precautions are heeded and wear rubber gloves.

Materials Necessary
Absorbent, lint-free cloth and alcohol.

Note
Water droplets on the tip of the probe indicate possible contamination. This can affect the LLD function which may lead to analyzer problems.



1. Power off the analyzer. Gently raise the sipper probe up and out of the rinse well.
2. Rotate the sipper arm manually so that the probe can be easily accessed.
3. Clean the probe with a lint-free cloth soaked in alcohol.

⚠ **CAUTION**
Handle the sipper probe with care. Do not bend. A bent sipper probe can cause a run to stop as well as analyzer errors and incorrect results.

10.3.4 Clean the S/R Probe

Wipe the S/R probe clean every second week to remove contamination.

Safety Precautions
The analyzer must be switched off. The S/R probe is potentially biohazardous. Ensure that the normal laboratory safety precautions are heeded and wear rubber gloves.

Materials Necessary
Absorbent, lint-free cloth and alcohol.

Note
Water droplets on the tip of the probe indicate possible contamination. This can affect the LLD function (Liquid Level Detection) which may lead to analyzer problems.

1. Power the analyzer off. Gently raise the S/R probe up and out of the rinse well.
2. Rotate the S/R arm manually so that the S/R probe can be easily accessed.
3. Clean the probe with a lint-free cloth soaked in alcohol.

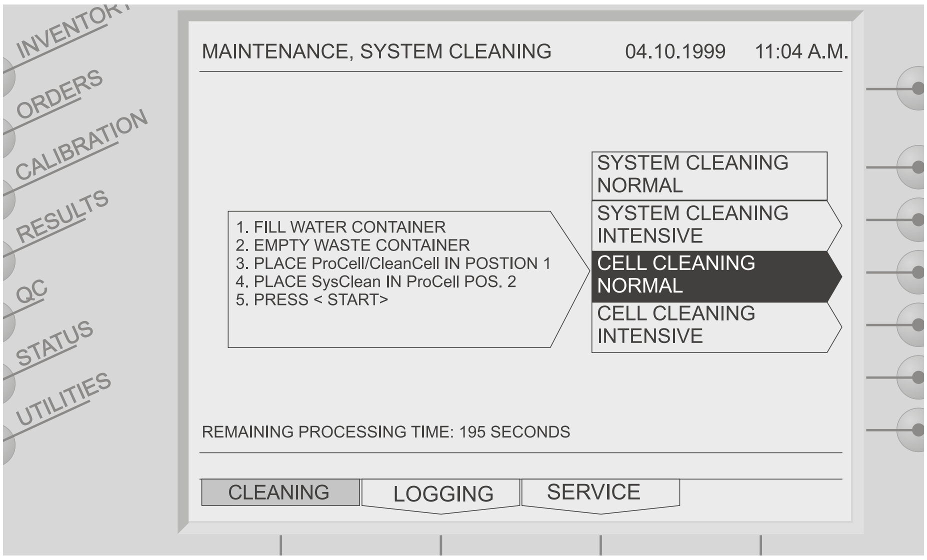
CAUTION
Handle the S/R probe with care. Do not bend. A bent S/R probe can cause a run to stop as well as analyzer errors and incorrect results

10.3.5 Perform CELL CLEANING NORMAL

Perform the CELL CLEANING NORMAL function every second week. CELL CLEANING NORMAL cleans the sipper flow path and measuring cell.

Safety Precautions
Ensure that the normal laboratory safety precautions are heeded and wear rubber gloves and protection glasses.

Materials Necessary
Cleaning solution = ISE (Cleaning solution) SYSCLEAN.


MAINTENANCE, SYSTEM CLEANING 04.10.1999 11:04 A.M.

1. FILL WATER CONTAINER
2. EMPTY WASTE CONTAINER
3. PLACE ProCell/CleanCell IN POSTION 1
4. PLACE SysClean IN ProCell POS. 2
5. PRESS < START>

REMAINING PROCESSING TIME: 195 SECONDS

1. Press the UTILITIES key and then the MAINTENANCE key. The MAINTENANCE, SYSTEM CLEANING screen is displayed.
2. Press the CELL CLEANING NORMAL key and follow the instructions displayed on screen.
3. Place a cleaned ProCell bottle with 60ml SysClean (= ISE Cleaning solution) in ProCell position of ProCell/CleanCell set 2.This is a tempory solution until the cleaning adapter is available.
4. Press the START key. Elecsys 1010 starts the cleaning process and displays the time remaining until the process is complete. Press PAUSE (at the bottom right of the screen) to interrupt the cleaning process. The process can be continued by pressing CONTINUE (same key).
5. Elecsys 1010 displays a message when the cleaning process is complete. Remove the automatic cleaning utensils at this point (e.g. SysClean and clean out the water container with distilled or deionized water. Place the water container back into its location. The container must audibly lock into place. Place also a new ProCell bottle in the ProCell position and update the INVENTORY, REAGENT screen.
   CELL CLEANING NORMAL is now complete.

CAUTION
If the cell cleaning program is interrupted, e.g. instrument cover opened, any fatal error, etc., a PRIME& RINSE has to be started immediately to remove the ISE Cleaning

Note
Do not to use the CELL CLEANING INTENSIVE function. It is reserved only for the service personnel.

10.4 Maintenance, As Required

10.4.1 Clean the Analyzer Surfaces and Cover

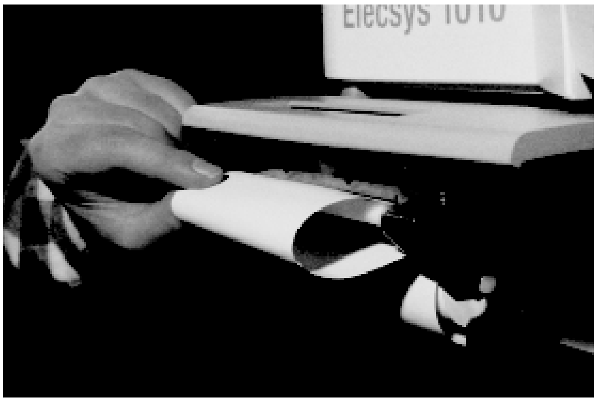
Clean the analyzer surfaces and the cover as required (e.g. after liquid is spilled) to prevent contamination.

Safety Precautions
The analyzer must be in Stand-by mode. Ensure that the normal laboratory safety precautions are followed and wear rubber gloves.

Materials Necessary
Paper towels and lint-free cloths soaked in normal disinfectant.

10.4.2 Replacing Printer Paper

Check the availability of paper for the printer daily to avoid interruptions to the printout of results.



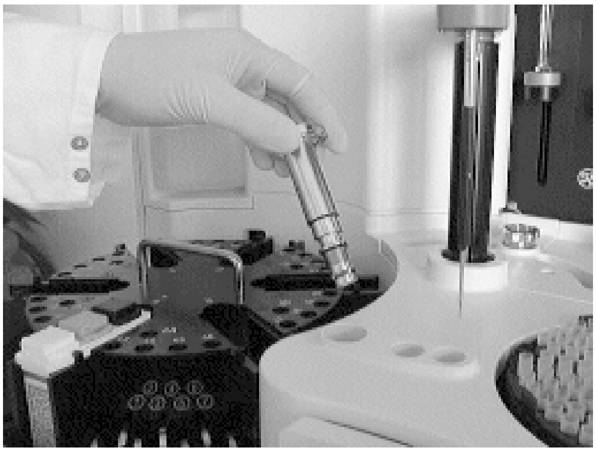
1. Gain access to the printer by pulling the cover from the bottom side up (lower left of the analyzer).
2. Take hold of the roller and pull it out towards the front.
3. Push the metal roller into the new paper roll and place it back into position. The paper must be oriented so it feeds from the top of the roll.
4. Feed the paper over the front roller and through the slot, as illustrated. An automatic feeder feeds the paper out through the front paper feed slot in the cover.
5. Close the cover.

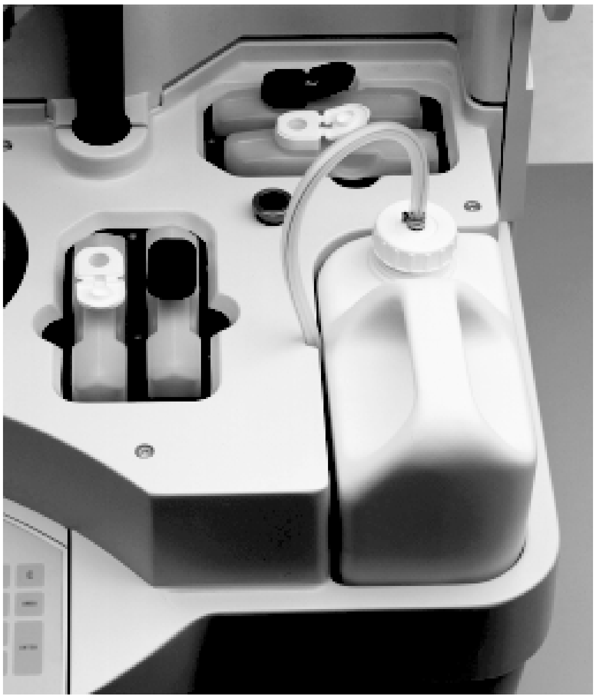
10.4.3 Clean the Rinse Stations

Clean all four rinse stations every two months to prevent contamination.

Safety Precautions
The analyzer must be switched off. Ensure that the normal laboratory safety precautions are followed and wear rubber gloves.

Materials Necessary
Cleaning brush, water and an ultrasonic bath (if available).





1. Unscrew (counter-clockwise) the knurled screws on all four rinse stations. Ensure that no liquid is spilled by covering the area with paper towels.
2. Clean the rinse stations using water and a brush (e.g. small commercial bottle brush). If available, place the rinse station inserts in an ultrasonic bath (15 minutes, 25000 Hz, at 60 °C).
3. Ensure that all o-rings are seated correctly before returning the inserts to their original positions. Refit the clean rinse stations in the corresponding positions and screw in tight.
4. Switch the analyzer back on using the switch on the left side.

10.5 Half-Yearly, Yearly, Special Maintenance

Service Maintenance

Frequency	Procedure	Required Material/ Detergents
Half-yearly	Clean Wash Station Inserts	Brush, water or if available Ultrasonic Bath (Frequency 25 KHz, max.60° C)
	SYSTEM CLEANING INTENSIVE	Edisonite 0.5 %, 2.5 L Id. No: 156 5524 001
	CELL CLEANING INTENSIVE	ISE Cleaning Solution 60 mL Id. No: 129 8500 316
	Replace: · Waste Pump Tubings · VAD 1 Pinch Tubings · S/R Tubing 1.5 · Plunger Syringe 2500 µL · Plunger Syringe 250 µL · O-Rings of Wash Station Inserts · Airfilter	Maintenance Kit E 1010 Id.No: 190 6941 001 If necessary (Trunk stock)Tubing Set E 1010 Id.No: 190 6933 001
	Check: (and replace if necessary) · Waste tubings from Wash Stations	
Yearly	Clean Wash Station Inserts	Brush, water or, if available, Ultrasonic Bath (Frequency 25 KHz, max.60° C)
	SYSTEM CLEANING INTENSIVE	Edisonite 0.5 %, 2.5 L Id. No: 156 5524 001
	CELL CLEANING INTENSIVE	ISE Cleaning Solution 60 mL Id. No: 129 8500 316
	Replace: · Waste Pump Tubings · VAD 1 Pinch Tubings · S/R Tubing 1.5 · Plunger Syringe2500 µL · Plunger Syringe 250 µL · O-Rings of Wash Station Inserts · Airfilter · Water Filter · Buffer Tank· Cell · Sipper Tubings 1 to 3 · Restrictor Tubing	Maintenance Kit E 1010 Id.No: 190 6941 001 Measuring Cell w. Ref.El Id.No: 170 6683 001 Tubing Cell 0.8 Id.No: 180 2658 001 Tubing Sipper (1) Id.No: 180 2631 001 Tubing Sipper (2) Id.No: 180 2640 001 Filter Ct Wash System Id.No: 140 6531 001 Buffer Tank Id.No: 190 5317 001 Restrictor Tubing Id.No: 1905325 001 Tubing Set E 1010 Id.No: 190 6933 001
	Check: (and replace if necessary) · Waste tubings from Wash Stations · Tubings 1.4, 2.4, 3.1, 3.6, 5.0, 5.1, 6.2 · Probe S/R · Probe Sipper · Beadmixer	

e10-1

Half- Yearly Maintenance

Procedure

In order to clean and to disinfect the instrument, SYSTEM CLEANING INTENSIVE as well as CELL CLEANING INTENSIVE should be activated prior to the replacement of parts:
Switch the instrument on and activate “SYSTEM CLEANING INTENSIVE”. For part 1 of this cleaning program, fill the System Water Container with at least 2.5 L of 0.5% Edisonite Solution.

As soon as part 1 is finished, rinse the System Water Container with deionized water, fill it with deionized water, put it back to the instrument and activate part 2 of the cleaning program (Press the START button).

CELL CLEANING INTENSIVE

Fill the System Water Container with deionized water, empty the waste container. Put a ProCell container which is filled with 60 ml ISE Cleaning Solution on position 2 of the System, Reagent compartment. Activate the function CELL CLEANING INTENSIVE. Afterwards remove the S/R Rotor as well as Wash Station Inserts, “Cover Inside” (362), MFA Housing Insert”(366), “Instrument Housing Top” (360) and the “Front Panel”(369). Refer to chapter 4.1.1 of the Service Manual.

Tubings

Replace the Waste Pump Tubings, the Pinch Tubings and the S/R Tubing 1.5. Check the Waste Tubings (coming from the Wash Stations) and replace them in case of any visible contamination.

Syringes

Replace the plungers of the S/R Syringe and the Sipper Syringe.

Airfilters

Replace the Airfilter Inserts.

Wash Stations

Clean the Wash Station Inserts with water using a soft brush. Check, if there are any particles inside the jets and remove them if necessary. Afterwards the O-rings of the Wash Station Inserts are to be replaced.

All parts required for the half-yearly maintenance are included in the “Maintenance Kit E 1010”

Final Checks and Calibrations

Check mechanical adjustments as well as pump volume adjustments (Service Software). Run a CELL CHECK and edit the existing “Kosigkal.csv”-file accordingly. All test assays are to be calibrated after the maintenance! Run at least 3 different test parameters and check the calibration results as well as the precision.

Yearly Maintenance

Procedure

Follow the procedure “Half-Yearly Maintenance”. It is recommended to replace the following parts in addition (to be ordered seperately).

Water Supply System

Replace the Buffer Tank as well as the Water Filter (called CT-wash filter).

Cell

Replace the Cell incl. Reference Electrode, Cell Tubing 0.8, Tubing Sipper (1), Tubing Sipper (2), as well as the Restrictor Tubing (between VM1 and waste tubing). Even though the Cell is replaced completely, the CELL CLEANING INTENSIVE should be done before, because this measure will clean the Preheater as well (potential clots).

Important! It is essential that at least 30 “Prepare Cycles” are performed before the system is calibrated! Start the Service Software and activate the function “CELL INSTALL” in order to run the a.-m. cycles. Since the volume of the Sipper System has changed after the replacement of the Cell and the Sipper Tubings, it is important that “SYSTEM VOLUME CHECK” is done before the instrument is used.

Final Checks and calibrations

Check mechanical adjustments as well as pump volume adjustments (Service Software). Run a CELL CHECK and edit the existing “Kosigkal.csv”-file accordingly. All test assays are to be calibrated after the maintenance! Run at least 3 different test parameters and check the calibration results as well as the precision.

Service Maintenance

Frequency	Procedure	Required Material/ Detergents
In case of potential bacterial contamination only.	SYSTEM CLEANING INTENSIVE	Edisonite 0.5 %, 2.5 L Id. No: 156 5524 001
	CELL CLEANING INTENSIVE	ISE Cleaning Solution 60 mL Id. No: 129 8500 316
	Replace: · Buffer Tank · Water Filter · Tubings Water Supply: ⇨ 5.0, 5.1, 6.2, 3.7, ⇨ 1.1, 1.4, 2.4, 3.1, 3.6, ⇨ Tubing Dilutor S/R ⇨ Tubing S/R 1.5 · Tubings Water Supply WS1 ⇨ 3.2, 3.3, 3.4, 3.5 and Y-Piece · Tubings Water Supply WB1 ⇨ 3.10, 3.11, 3.12, and Y-Piece · Tubings Water Supply WD1 ⇨ 3.8, 3.15, 3.16, and Y-Piece · Tubings Water Supply WD 2 ⇨ 3.9, 3.13, 3.14, and Y-Piece	Tubing Set E 1010 Id.No: 190 6933 001 Filter Ct Wash System Id.No: 140 6531 001 Buffer Tank Id.No: 190 5317 001 Tubing S/R 1.5 Id.No: 180 2666 001 Tubing Dilutor S/R Id.No: 190 6976 001
	Clean Wash Station Inserts	Brush, H2O2 Solution (Peroxide) or if available Ultrasonic Bath (Frequency 25 KHz, max.60° C)
	SYSTEM CLEANING INTENSIVE (with 3% H2O2 Solution) 2 nd step with deionized Water	2L 3 % H2O2 Solution (Peroxide) (local Dealer)

e10-2

Attention:

This procedure must be used in case of potential bacterial contamination only!
Only RD FSRs are allowed to run this procedure!

Special Maintenance

Procedure

All tubings which will be replaced during “Special Maintenance” can be created of the “Tubing Set E1010”. Exceptions: Tubing S/R 1.5 and Tubing Dilutor S/R.

In order to clean and to disinfect the instrument, SYSTEM CLEANING INTENSIVE as well as CELL CLEANING INTENSIVE should be activated prior to the replacement of parts: Switch the instrument on and activate “SYSTEM CLEANING INTENSIVE”. For part 1 of this cleaning program, fill the System Water Container with at least 2.5 L of 0.5% Edisonite Solution.

As soon as part 1 is finished, rinse the System Water Container with deionized water, fill it withdeionized water, put it back to the instrument and activate part 2 of the cleaning program (Press the START button).

CELL CLEANING INTENSIVE

Fill the System Water Container with deionized water, empty the waste container. Put a ProCell container which is filled with 60 mL ISE Cleaning Solution on position 2 of the System Reagent compartement.

Activate the function CELL CLEANING INTENSIVE.

Afterwards remove the S/R Rotor as well as Wash Station Inserts, “Cover Inside” (362), MFA Housing Insert”(366), “Instrument Housing Top” (360) and the “Front Panel”(369). Refer to chapter 4.1.1 of the Service Manual.

Water Supply System

Basically all tubings of the Water Supply System are to be replaced (see table above). In addition the tubings “Tubing S/R 1.5” and “Tubing Dilutor S/R” should be replaced as well.

Buffer Tank

Replace the Buffer Tank as well as the Water Filter (called CT-wash filter).

Wash Station Inserts

Clean the Wash Station Inserts with **3% Peroxide** solution using a soft brush. Check, if there are any particles inside the jets and remove them if necessary.

After the reassembly

Switch the instrument on and activate “SYSTEM CLEANING INTENSIVE”. For part 1 of this cleaning program, fill the System Water Container with at least 2 L of **3% Peroxide** Solution.

As soon as part 1 is finished, rinse the System Water Container with deionized water, fill it with deionized water, put it back to the instrument and activate part 2 of the cleaning program (press the START button).

Final Checks and calibrations

Check mechanical adjustments as well as pump volume adjustments (Service Software). Run a CELL CHECK and edit the existing “Kosigkal.csv”-file accordingly. All test assays are to be calibrated after the “Special Maintenance”! Run at least 3 different test parameters and check the calibration results as well as the precision.

Note:

> **If one of the cell cleaning programs (CELL CLEANING NORMAL or CELL CLEANING INTENSIVE) is interrupted, e.g. instrument cover opened, any fatal error, etc, a PRIME&RINSE has to be started immediately! (In order to remove the ISE Cleaning Solution).**

Preparation of 0.5 % EDISONITE solution

Dissolve 10g of EDISONITE powder in 2 L of warm
(25 C to 35 C) water .
Either deionized (preferable) or tab water may be used.
Fill the completely dissolved solution into an empty
System Water Container and put it onto the anaylzer.
Activate the function SYSTEM CLEANING INTENSIVE

Hint

If no balance is available in the laboratory, you may use a 50 mL measuring cylinder in order to determine the amount of EDISONITE powder:
10 g is equivalent to about 13mL of powder.

Contents of Maintenance Kit ELECSYS 1010 and Tubing Set ELECSYS 1010

The contents of the Maintenance Kit E 1010 and the Tubing Set E 1010 are listed in the tables below:

Maintenance Kit Elecsys 1010 RD Id.: 190 6941 001

Amount:	Part:
1 Set	Air Filter
1 Set	Tubings Waste Pump
3 m	Waste Tubing (Tygon)
1 Set	Pinch Tubing (for VAD1)
1 Set	O-rings (for Wash Station inserts)
1	Piston for Syringe 250 uL
1	Piston for Syringe 2500 uL
1	Tubing S/R 1.5

e10-3

Tubing Set Elecsys 1010 RD Id.: 190 6933 001

Amount:	Part:
10	Fitting (grey)
6	Fitting (red)
5	Fitting (yellow)
6	Fitting (green)
6	Fitting (blue)
6	Fitting (black)
3	Fitting (white)
30	Adapter (nipples for wash stations)
5 Meter	Tubing (inner diameter 1.5 mm)
3 Meter	Tubing (inner diameter 2.0 mm)
4	Distributor (plastic) (Input Wash stations)
5	Distributor (plastic) (Y-shape)
7.5 Meter	Waste Tubing (Tygon)
0.5 Meter	Silicon Tubing (outer diameter 8mm , inner diameter 5mm)
0.5 Meter	Silicon Tubing (outer diameter 7mm , inner diameter 4mm)
6	Nipple (for Buffer Tank)

e10-4

10.6 Preventive Maintenance

The following parts should be replaced on a regular basis:

Partname	**Material No.**	**6 month**	**12 month**	**24 month**	**Total parts / year**
SYRINGE SIPPER	1709828001			Yes	0,5
SYRINGE S/R	1709801001			Yes	0,5
TUBING SET	1801929001		Yes		1
TUBING SIPPER (2) 0.8	1802640001		Yes		1
TUBING SIPPER (1) 0.8	1802631001		Yes		1
TUBING WASTE	1801902001			Yes	0,5
TUBING S/R 1.5	1802666001			Yes	0,5
TUBING CELL 0.8	1802658001		Yes		1
SPARE PART KIT MC	1706683001		Yes		1
NEEDLE SIPPER	1709780001			Yes	0,5
NEEDLE S/R	1709798001			Yes	0,5
BEADMIXER	1709968001			Yes	0,5
MAINTENACE KIT	1802119001	Yes			2

10-2-1

The above-mentioned parts should be exchanged when the instrument is under service contract. The recommended regular maintenance interval is 6 months. A cell exchange needs to be done after 12 months.

10.7 Maintenance Materials

Necessary materials for operator maintenance which can be ordered from RD.

Name	**Material number**
Edisonite® (1 kg)	1565524
Edisonite® (1 kg) + measuring cup	1997203
SysClean (5 bottles à 100 mL)	1298500
SysClean adapter	1933159
Printer paper	1709615

Glossary

Appendix

AB	assay buffer
AC	
A/D	analogue to digital
ADC	analogue to digital converter
AE	working electrode
B	beads
BCR	barcode reader
BIOS	basic input output system
BP	base print
BP1	detection module
BP2	sample/reagent dilutor
BP3	temp control module
BP4	sample/reagent rotor and incubator rotor
BP5	dilutor reagent
BP6	incubator heater
BP7	clot detection module
CAN	controller area network
CE	
CPU	central processing unit
CS	cleaning solution
D	aspiration into the measuring cell and optical detection
D/A	digital to analogue
DC	
DD	
DL	diluted sample/calibrator/check
DIN	Deutsche Industrie Norm
DOS TUS	DOS test and control software
DRAM	dynamic random access memory
ECL	electrochemical luminescence
EMC/EMB	
EPROM	electrical programmable read only memory
E^{2}PROM	electrical erasable and programmable read only memory
F	fatal error
FD	floppy disk
gnd	ground
HS	
I	information
i	incubation time
IBM/AT	
ID	identification
I D E	
IRS	
I-CAL	
KUST	communication and control software
K3FLA14A	normal sequence for measuring heterogenous bead suspensions
K3CHE14A	special sequence for measuring homogenous solutions
LC display	liquid crystal display
LLD	liquid level detection
LED	light emitting diode
LSM	laboratory system manager
MBC	two dimensional barcode
MFA	multifunctional arm
NTC	negative temperature coefficient
OEM	original equipment manufacture
ORIGEN®	new measuring technology
PSD	
PMT	photomultiplier tube
PSID	positive user identification
PC	personal computer
PhC	photocoupler
PS	prereaction solution
POP	
PCB	printed circuit board
PWS	
PWD	
RA	return authorization
RAM	random access memory
RE	reference electrode
ROM	read only memory
RS232	serial interface
RackPack	special reagent bottle combination
R0	diluent
RM	pretreatment solution
R1	reagent 1 (assay RackPack)

R2	reagent 2 (assay RackPack)
S	undiluted sample/calibrator/check
S/R	sample/reagent
STAT	short-turn-around-time
SP	
SW on	software on
SyMu	
SM	
SRAM	static random access memory
SW	software
SD	
SBC	
TTL	
VAD1	
VDD	
VGA	video graphics array
VAB1	
VAD2	
VDC	direct current voltage
VWD1	
VWD2	
VWB1	
VSD	
VM1	
VWS1	
VAS1	
VDE	
WA	
WE	
WB1	
WD2	
WD1	
WS1	
W	warning

2 Installation

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2 Installation

2.1 Site Requirements

Packaging

Packaging dimensions of Elecsys 1010:

Length:	120 cm
Height:	100 cm
Depth:	100 cm
Total weight:	approx. 156 kg incl. package

Transport to the Installation Site

Prerequisites for a safe transport of the instrument to the installation site after unpacking:

- Minimum door width:	80 cm
- Minimum turning circle:	100 cm

Note:
The customer may take his/her own special precautions for unpacking or transport to the site.

Space Requirements at the Site

The Analyser weighs approximately 120 kg. Weight is distributed on four (4) levelling feet, 1/2" diameter.

Dimensions of the instrument:
Width: 96 cm
Height:62 cm
Depth: 78 cm
Minimum distance to front and back: 30 cm.

Water Quality Requirements

Deionized (or distilled) water is normally used.
Specification of the water treatment plant:

- Required water quality: deionized or distilled water with a resistance of 1.5 megohm or greater (conductivity below 1 µ Siemens).

Reagent Storage

Store the test reagents in a cool place at a temperature of 2 - 9° C. Assay buffer and cell cleaner do not have to be stored in a cool place.

Roche Diagnostics recommends to keep a reagent stock for sixty (60) days. This quantity should be sufficient to compensate for any supply delays. The stock keeping requirements depend mainly on the system configuration and the instrument volume.

Ventilation and Air Conditioning Requirements

- A tenfold air exchange per hour is required near the instrument
- The instrument must not be in a direct draft from above or from the side.

Air Conditioning

An ambient temperature of 18° to 32° C (60° to 95° F) is required for faultless operation. Avoid direct exposure to heat (sunlight). The temperature must not vary by more than ± 3° C. Relative air humidity 45-85%, without condensation.

Electric Connection

Conditions for electric connection:
Self-adjusting mains connection with an input voltage of 80 to 250 VAC, 800 VA, 50 to 60 Hz.

The 80/250 VAC connection must meet the following requirements:

- 3-lead single phase wiring, grounded, grounding < 10 ohm.
- Rated for a minimum of 10 A (220/240 V) and/or 20 A (100/115 V), termination by power outlet.

Variations of the above specifications need to be examined and approved by the technical service.

Faultless operation of the Roche Diagnostics instrument can only be guaranteed in accordance with the above specifications. The CUSTOMER acknowledged by signature that operation of the Elecsys 1010 in different conditions without prior consent by the technical service may void the warranty.

Connect Elecsys 1010 only by using one of the enclosed (RD) power cables.

2.2 Inventory

Designation	Quantity	Conf.	Remarks
Instrument incl. accessories	1		
Instrument	1	*	
dest. water bottle, complete	1		
BOTTLE WASTE	1	*	supplied with the instrument
Sipper needle	1		
S/R needle	1		
Power cable US	1		
Power cable GERMAN	1		
3 x 4 Assay Cup Set	1		
Cell + Ref. el.	1		
SYRINGE S/R	1		
SYRINGE SIPPER	1		
Software Operator	1		
Ref. data disk	1		
Printer paper	1		
Packaging accessories	1		
Packaging instrument	1		
Packing list	1		
Parameter disk	1	*	supplied with the instrument
Beadmixer	1		
Cup Twist	2		
Secundarcupadapter	6		
Sample Cup			
Bottle Valve	1		
Certificate	1	*	

Operator Manuals

Operator Manual German			to be ordered separately
Operator Manual English			to be ordered separately

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2.2.1 Location

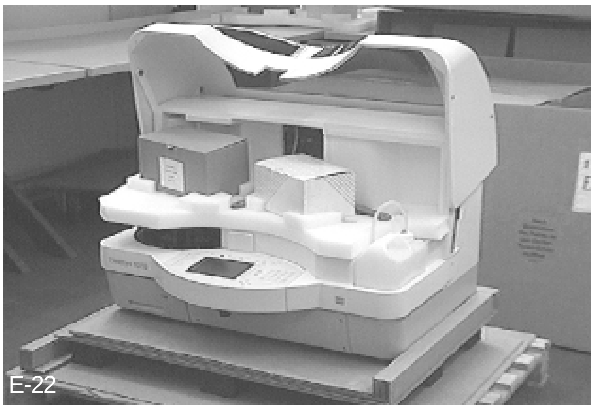


Fig.: Instrument incl. accessories

Fig.: Sipper needle

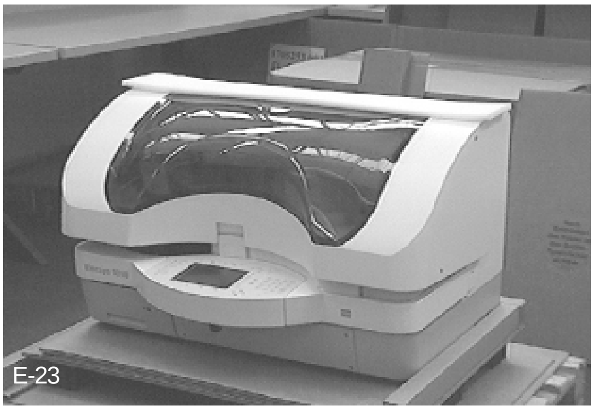


Fig.: Instrument

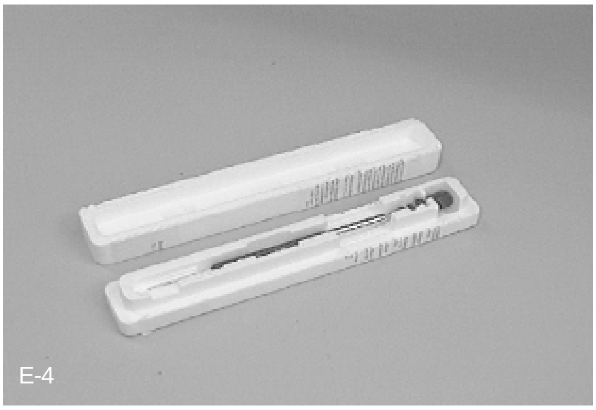


Fig.: S/R needle

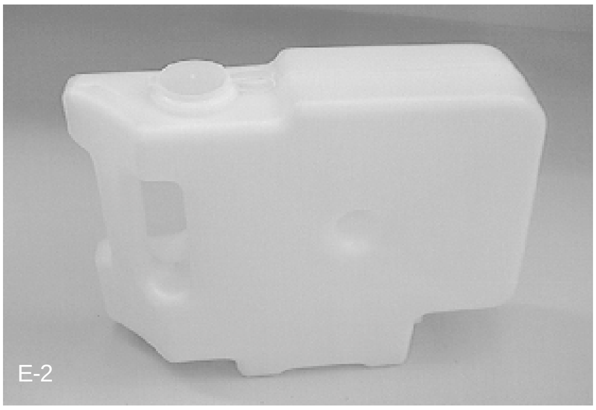


Fig.: Dist. water bottle, complete

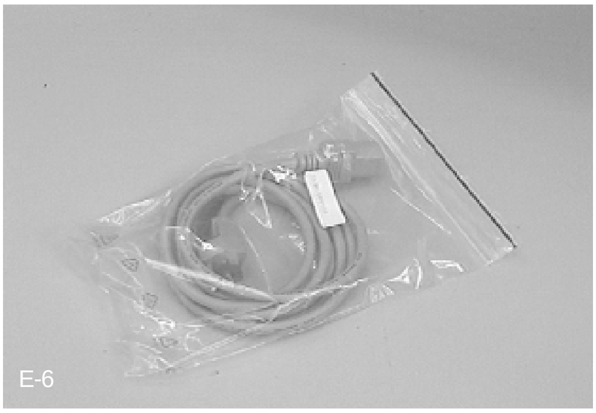


Fig.: Power cable US

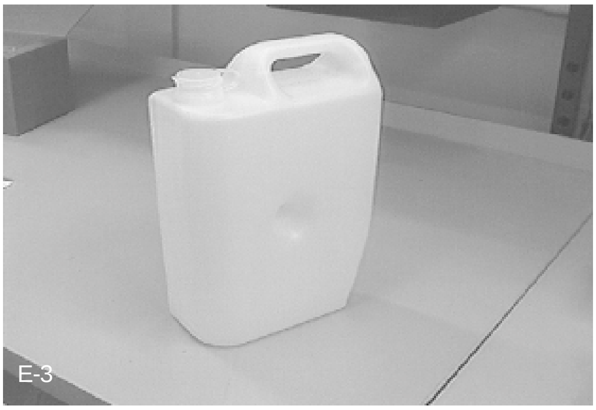


Fig.: Bottle waste

Fig.: Power cable GERMAN

Fig.: 3 x 4 Assay Cup Set

Fig.: Operator software

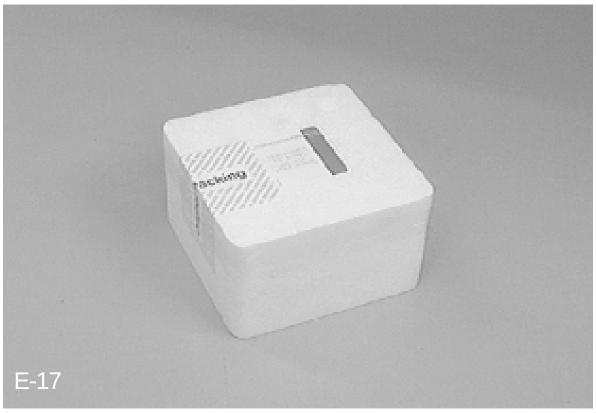


Fig.: Cell + ref. el.

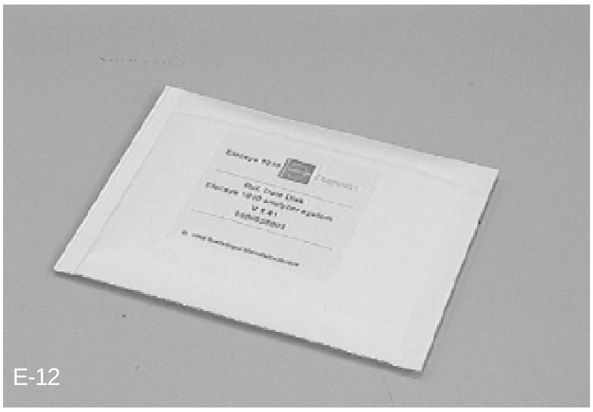


Fig.: Ref. data disk

Fig.: SYRINGE S/R

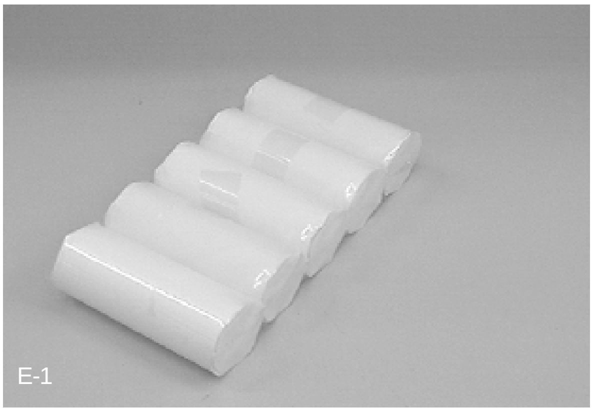


Fig.: Printer paper

Fig.: SYRINGE SIPPER

Fig.: Packaging accessories

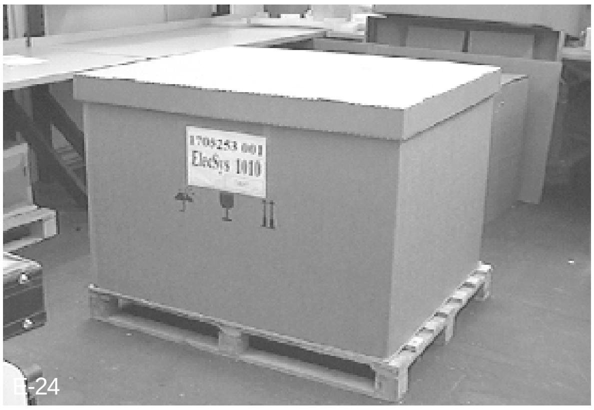

1705253 001
ElecSys 1010
E-24

Fig.: Packaging instrument

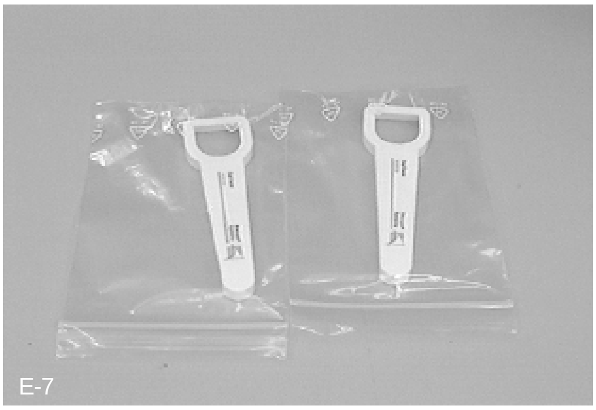


Fig.: Cap twist

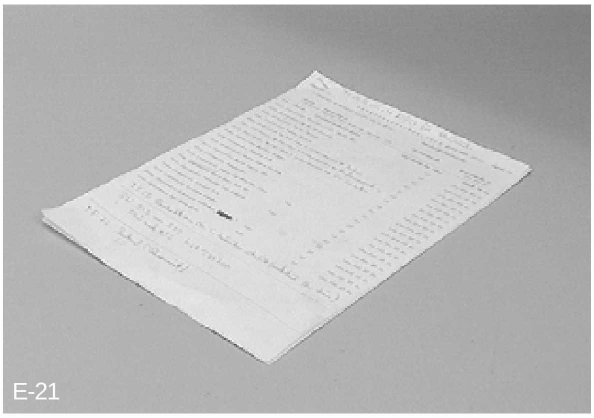


Fig.: Packing list

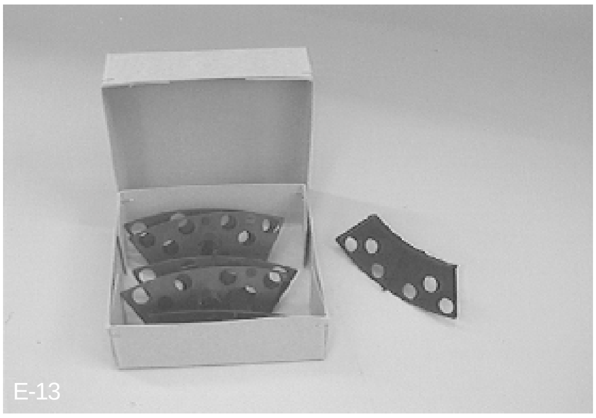


Fig.: Secondary cupadapter

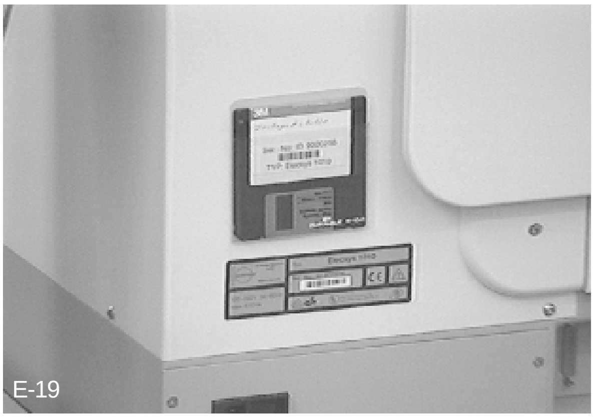


Fig.: Parameter disk

Fig.: Sample cup

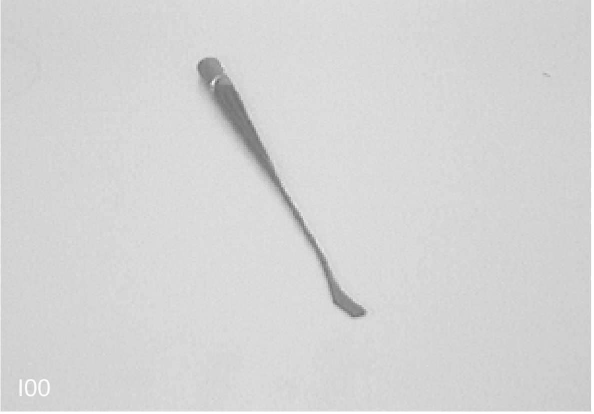


Fig.: Bead mixer

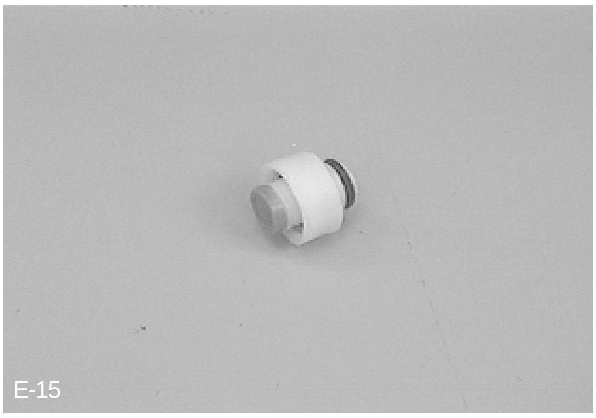


Fig.: Bottle valve

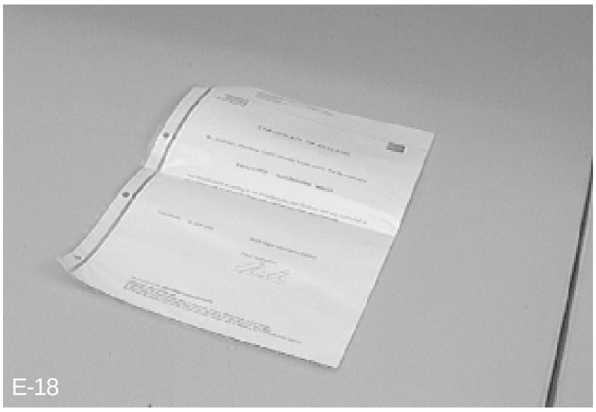


Fig.: Certificate

2.3 External Computer Installation

The Elecsys 1010 has a RS232 interface for the connection of an external computer. The Laboratory System Manager (LSM) is also connected to this interface. The communication protocol is based on the ASTM standard. Instrument data can be transmitted by the same interface via modem (Remote Access). On the interface supporting plates, there is an additional Centronics interface connector for an external printer.

2.4 Software Installation

The operation software is delivered on 1 disk coming with the instruments.

The disk is labeled with:

- User Software Elecsys 1010 Version XX

The software is preinstalled on the flash ROM of the OEM master. In case a software update need to be reloaded, please follow the given instructions:

1. Insert the disk in the disk drive and switch on the instrument.

2. The software will be installed automatically
   Follow the instructions given on the screen. A complete installation will take appr. 10 min.

Note:

All software versions will contain the operating software and the corresponding module software. When updating the operating software all changes of the module software versions will be updated at the same time. The module software can be downloaded individualy using the DOS TUS software. When updating the operating software special care has to be taken to update the module software at the same time.

2.5 Analyzer Installation

2.5.1 Initial Installation

Task	Duration
Unpacking	20 min.
Assembling the Probes	10 min.
Assembling the Cell and Reference Electrode	30 min.
Software Installation (if required) see 2.4	
2 x Prime + Rinse	15 min.
Cell Install (Service Software)	30 min.
Instrument Setup + Interface setup	10 min.
Load Reference Data Disk, Set Inventory Perform Systemvolume check and Signallevel Calibration	30 min.
Place Reagents, Calibration and Controls	10 min.
TSH 10 Samples	30 min.
Service Report	10 min.
Overall Duration:	**195 min.**

2.5.2 Setup with preinstalled cell

Task	Duration
Unpacking	20 min.
Assembling the Needles	10 min.
Prime + Rinse	15 min.
Instrument Setup + Interface setup	10 min.
Load Reference Data Disk, Set Inventory Perform Systemvolume check and Signallevel Calibration	30 min.
Place Reagents, Calibration and Controls	10 min.
TSH 10 Samples	30 min.
Service Report	10 min.

Overall Duration: 135 min.

2.5.3 General Information

Prior to starting the initial installation procedure, check the supplied components against the packing list for completeness. Keep the original packing material of the instrument as it may be reused for future transports.

Protection against Earthquakes

To protect Elecsys 1010 in with seismic activities (e.g. California), remove two instrument feet and fix the instrument base to the table top by means of screws from below.

Removing the Securing Devices

Prior to removing the securing devices, set up the instrument at the final installation site. The securing devices should not be removed earlier.

Voltage Setting

No voltage setting is required as the instrument is equipped with a wide-range voltage input.

Connection to Mains

The instrument is connected to mains power by means of the power cord provided. The power cord is connected on the left hand side of Elecsys 1010.

Note:
In the USA the UL Power cord supplied with the analyzer should be used.

Printer Paper

To access the printer, open the printer cover and insert the paper real. Once the paper real is in place, insert the paper in the printer.

Bar Code Labels

Fix the bar code labels to the primary sample tubes.

Assay Cup (Incubator)

Up to 4 segments are placed in the incubator rotor. Ensure the pin on the underside of the segments is properly inserted in the holes provided in the incubator rotor.

2.5.4 Cell Exchange

The cell and reference electrode need to be exchanged at the same time. The exchange interval is normally after 1 year or 100,000 tests. This period is monitored by the counter in the maintenance log of the operation software.

Prior to the disassembly, the cell needs to be decontaminated. This is carried out with the service software by starting the „Cell Exchange" procedure. When the CleanCell is drawn into the cell it needs to remain inside for a minimum of 20 minutes. During this period routine maintenance work can be performed. After the decontamination procedure, part 2 of the cell exchange procedure can be started consisting of first priming the cell with ProCell followed by air. Then the cell may be removed from the instrument.

For more information refer to chapters 2.5.5 and 2.5.5.1

2.5.5 Cell installation

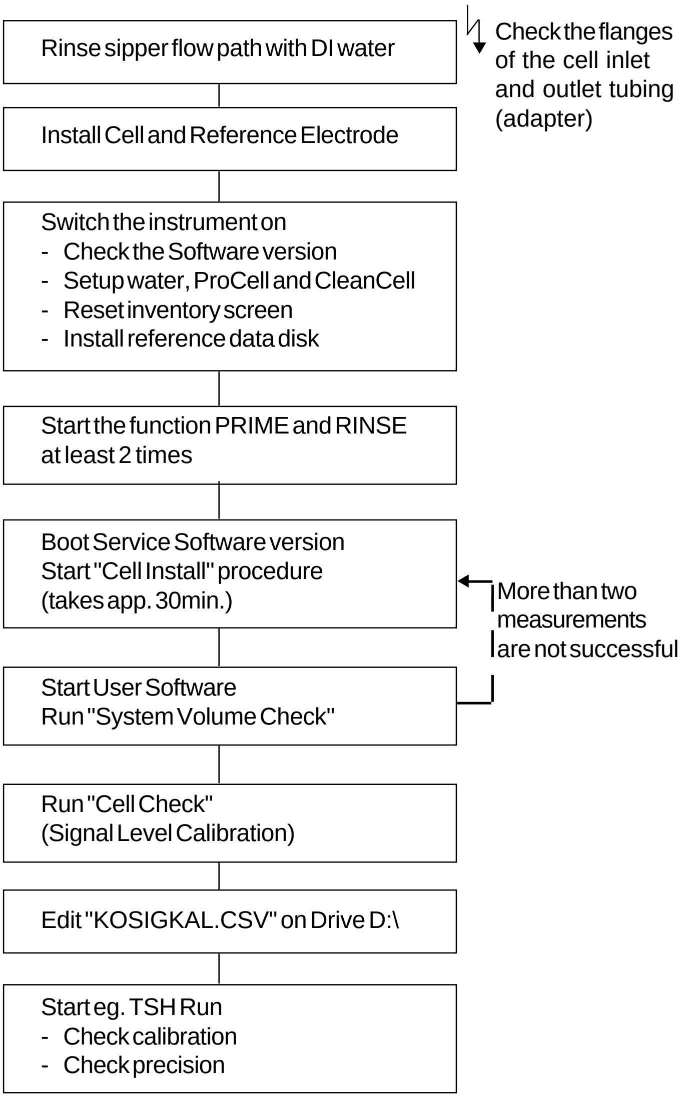
Prior to the cell installation it is recommended to prime the tubings from the sipper syringe to the sipper probe with DI-water to remove any ProCell crystallization.

Perform the following actions:

1. Remove the cover inside in front of the detection unit with the two screws on top of the instrument housing.
2. Open the housing of the detection unit.
   - Care should be taken by not dropping the two lower screws into the instrument.
3. Remove the PMT.
   - Special care should be taken when disconnecting the high voltage connector from the PCB BP1 in the back and the PMT signal connector in the front of BP1. The connectors on the BP1 are SMD connectors!!
4. Check whether the joint mounted between the in and out tubing of the cell is correctly mounted and does not leak.
5. Mount the tubing on the preheater and the sipper probe (this tubing is located in the accessory box).
   - Make sure that both fittings are tight!!
6. Remove the tubing on the top left side of the sipper syringe.
7. Flush DI-water through this tubing manually using a syringe while holding the sipper probe into the waste bottle (repeat several times).
8. Mount the tubing to the sipper syringe again. Same for the sipper probe to the MFA.
9. Check the guide pins of the cell for proper placement. If necessary fix these guide pins in the holes using super glue.
10. Mount the reference electrode to the cell.
11. Fix the cell cables around the reference electrode using a cable tie.
12. Mount the cell.
13. Connect the cell to the PCB Potentiostat and the cable to the reference electrode.
14. Mount the PMT and reconnect the cables to BP1.
15. Close the cover of the detection unit.

2.5.5.1 Cell Installation Flow Chart

The most important actions of the cell installation are summarized in the flow chart below:



Rinse sipper flow path with DI water

Check the flanges of the cell inlet and outlet tubing (adapter)

Install Cell and Reference Electrode

Switch the instrument on
- Check the Software version
- Setup water, ProCell and CleanCell
- Reset inventory screen
- Install reference data disk

Start the function PRIME and RINSE at least 2 times

Boot Service Software version
Start "Cell Install" procedure
(takes app. 30min.)

More than two measurements are not successful

Start User Software
Run "System Volume Check"

Run "Cell Check"
(Signal Level Calibration)

Edit "KOSIGKAL.CSV" on Drive D:\

Start eg. TSH Run
- Check calibration
- Check precision

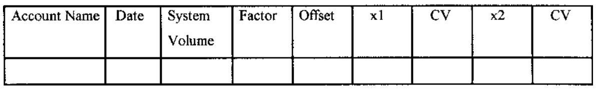
2.5.6 Installation Checklist Elecsys 1010

1. Locate and remove the following reagents from the refrigerator if necessary:
   TSH (1 rack pack), TSH Calibrator Set, PROCELL (2 bottles), CleanCell (2 bottles), BLANK CELL (1 rack pack).
2. Unpack Analyzer.
3. Inventory accessories shipped with analyzer. (Refer to Service Manual Chap. 2.2). Verify Software Installation and Reference Data disks are the current version.
4. Install the Measuring Cell.
5. Check **ALL** tubing connections for a tight fit. (These can work loose in shipping.)
6. Verify that all circuit boards are fully pushed home. (These can work loose in shipping).
7. Install Probes, Syringes and Mixer.
8. Check and replace as necessary DI WATER, PROCELL, CleanCell and ASSY CUPS.
9. Close the cover; power UP analyzer and allow to enter ”STANDBY”.
10. Verify software version, and perform a software installation if necessary (refer to TSB 778 for software installation procedure.
11. If necessary, read in the current revision of REFERENCE DATA disk.
12. Perform two ”PRIME & RINSE” cycles. (Util- Maintenance- Service).
13. Insert Service Software Disk into Floppy Drive and power Analyzer OFF then ON.
14. Select Service Software by pressing 1 on the keypad.
15. Perform a ”CELL INSTALL” function. (Check- Detector/Cell- Cell Install). Observe the liquid flow through VM1 for any air leaks. Correct any leaks and perform CELL INSTALL again if necessary.
16. Remove Service Software Disk from Floppy Drive, then power Analyzer OFF then ON.
17. When Analyzer reaches STANDBY, perform a ”SYSTEM VOLUME CHECK”. Verify that the volume is within the specified limits. (Util- Maintenance- Service).
    Note: If more that two consecutive SYSTEM VOLUME CHECKS are unsuccessful, check all tubing connections and perform a CELL INSTALL function under the Service Software before repeating the SYSTEM VOLUME CHECK. This will recondition the measuring cell electrodes.
18. Insert Service Software Disk into Floppy Drive and power Analyzer OFF then ON.
19. Select Service Software by pressing 1 on the keypad.
20. Use service software to read High Voltage value from BSP 1 board. Write HV value on a sticky label and attach to the PMT assy. Reinstall the PMT cover.
21. Use service software to check and align, if necessary, all mechanisms and perform PUMP VOLUME adjustments.
22. Perform COMPUTE and then STORE. At the ”Please insert parameter disk” prompt, press any key to save the parameter to your service software disk.
23. Repeat Step 22, substituting the customer parameter disk at the ”Please insert parameter disk” prompt to save the parameters to customer parameter disk.
24. Remove Service Software Disk. Power analyzer Off then ON.
25. Perform two ”PRIME & RINSE” cycles. (Util- Maintenance- Service)
26. Perform a ”CELL CHECK” (Util- Maintenance- Service). Verify that there are no bubbles in the Sipper flow path. If the results are within allowed ranges, edit them into the KOSIGKAL.CSV file refer to TSB 778).

    CELL CHECK ranges are:
    OFFSET -212 to +108
    FACTOR 0.020 to 0.030

    NOTE: To check the contents of the KOSIGKAL.CSV file after editing:

    a) Go to DOS (Option 3 in Service Software boot menu);
    b) Type ”D:” and press the Enter key to go to the D Drive;
    c) Type ”TYPE_KOSIGKAL.CSV” [ENTER] ← yes, you type the word ”type”, with a space between it and ”KOSIGKAL.CSV”. This causes the contents of KOSIGKAL to be displayed on the screen. Verify that this data is correct.
27. Calibrate, then run controls and a 10 cup precision pool on at least one assay. (Preferred assay is TSH).
28. Record the following information and leave with the Analyzer



Account Name	Date	System Volume	Factor	Offset	x1	CV	x2	CV

Fig.: 2-5-6.tif

2.6 Transport Preparation (Decontamination of the Cell)

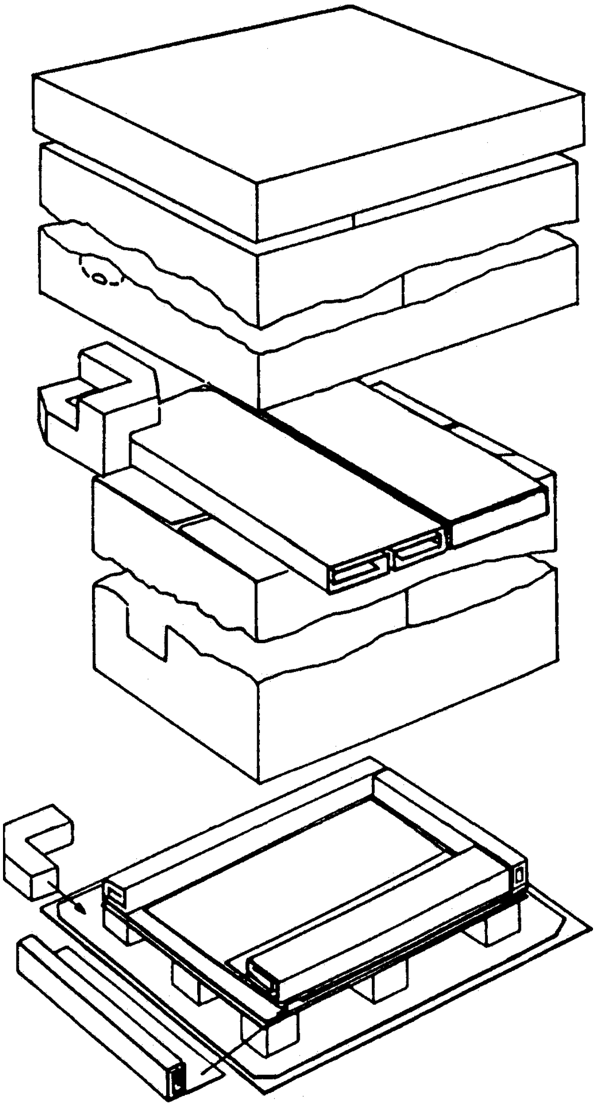
Task	Duration
Operation Software	
Cleaning	20 min.
Service Software	
Cell Exchange	20 min.
Transport Preparation	10 min.
Remove the Needles	10 min.
Rinse the Water Bottle	10 min.
Repacking	20 min.
Overall Duration:	**90 min.**

Note:

Prior to any service intervention, the decontamination procedure should be followed.

2.7 DE-Installation and Shipping Procedure

Note:
Before shipping the analyzer should be decontaminated using the ELECSYS 1010 decontamination procedure.



1. Empty DI water bottle and place back on the system.
2. Go to Utilities / Maintenance / Service and select the PURGE option. Repeat the PURGE option again. This will remove all DI water from the system. When finished empty the WASTE bottle and place it back in the system.
3. Remove top front cover to gain access to measuring chamber.
4. Remove black front cover from the measuring chamber to gain access to the PMT assy.
5. Remove the PMT assy from its mount in the measurement chamber taking note of the Ribbon cable connections to the circuit board and place the black plastic light shield over the entrance window. (The light shield can be found attached to the inside of the measurement assy black front cover removed in step #4).
6. Remove the measurement cell.
7. Join the two measurement cell tubes together with a female joint fitting.
8. Remove both probes and the mixer. These should be packed separately.
9. Remove both the syringes and pack separately.
10. Place shaped protective foam sheet over the top of the S/R disc / Incubation disc area and gently push the probe heads into the cutouts in the foam.
11. Place white foam panel over the shaped foam sheet and close the instrument lid. Use tape to secure the instruments lid to the instrument base during transport.
12. Secure the keyboard assy with tape.
13. Place the analyzer in the shipping crate as shown in the attached diagram and tape the crate shut.

3 Fluidics

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3 Fluidics

3.1 Fluidics Overview

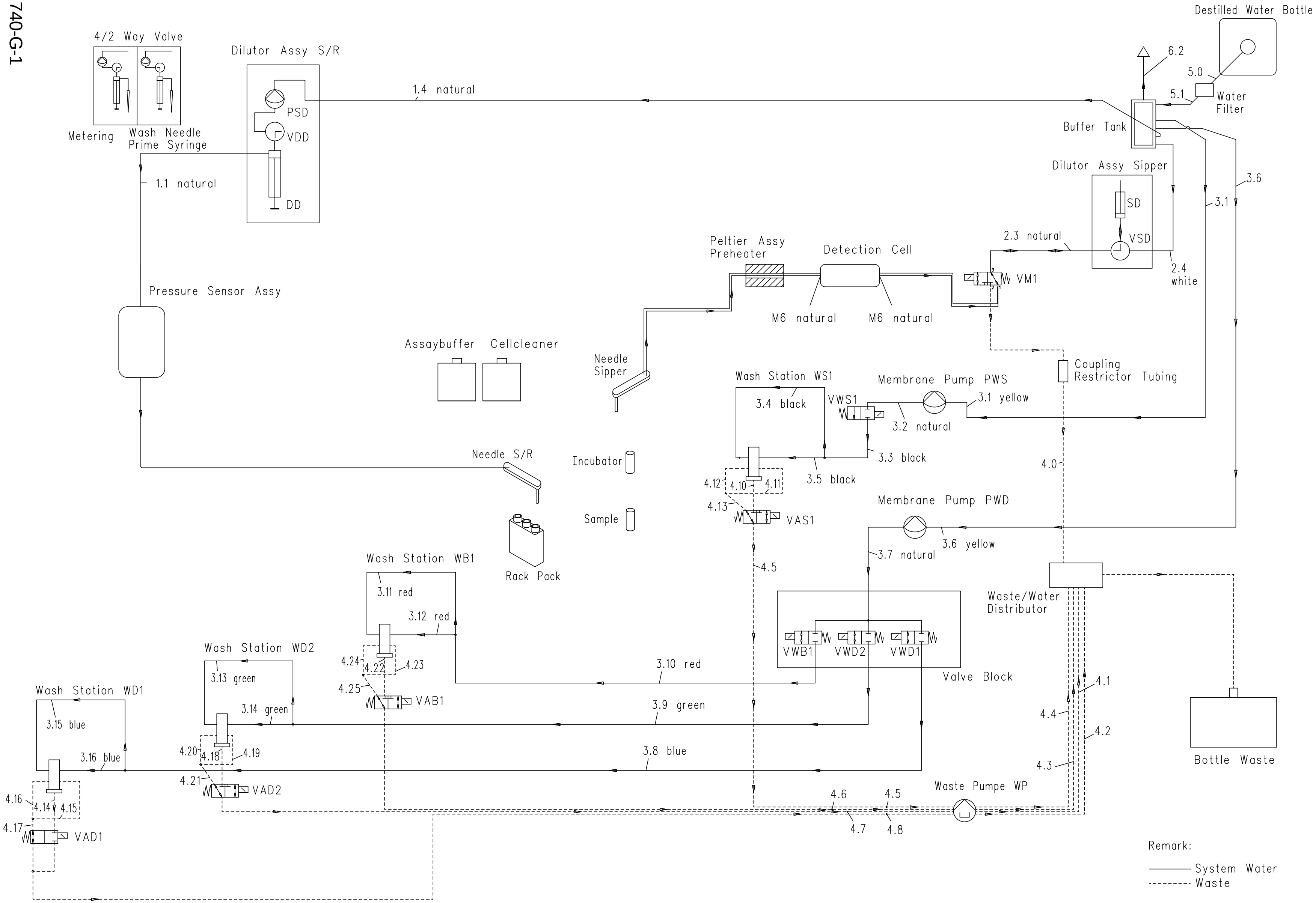

Destilled Water Bottle
Water Filter
5.0
5.1
6.2
Buffer Tank
Dilutor Assy Sipper
SD
VSD
2.4 white
2.3 natural
3.6
3.1
VM1
Detection Cell
Peltier Assy Preheater
M6 natural
M6 natural
Needle Sipper
Coupling Restrictor Tubing
4.0
Membrane Pump PWS
3.1 yellow
3.2 natural
VWS1
3.3 black
Wash Station WS1
3.4 black
3.5 black
4.10
4.11
4.12
4.13
VAS1
4.5
Membrane Pump PWD
3.6 yellow
3.7 natural
Waste/Water Distributor
Valve Block
VWB1
VWD2
VWD1
Bottle Waste
4.1
4.2
4.3
4.4
Waste Pumpe WP
4.5
4.6
4.7
4.8
3.10 red
3.9 green
3.8 blue
Wash Station WB1
3.11 red
3.12 red
4.22
4.23
4.24
4.25
VAB1
Wash Station WD2
3.13 green
3.14 green
4.18
4.19
4.20
4.21
VAD2
Wash Station WD1
3.15 blue
3.16 blue
4.14
4.15
4.16
4.17
VAD1
Incubator
Sample
Rack Pack
Needle S/R
Assaybuffer
Cellcleaner
Dilutor Assy S/R
PSD
VDD
DD
1.4 natural
1.1 natural
4/2 Way Valve
Metering
Wash Needle Prime Syringe
Pressure Sensor Assy
Remark:
System Water
Waste

Fig. 740-G-1

3.1.1 Legend

Name	**Location and Description**
Dilutor Assy S/R	Chapter 4.2.9 _______________ page 40
Dilutor Assy Sipper	Chapter 4.2.9 _______________ page 40
Needle S/R	Chapter 4.2.7 _______________ page 30
Pressure Sensor Assy	Chapter 4.2.10 ______________ page 42
Waste/Water Distributor	Chapter 4.2.18 ______________ page 58
Membrane Pump PWS	Chapter 4.2.13 ______________ page 46
Membrane Pump PWD	Chapter 4.2.13 ______________ page 46
Needle Sipper	Chapter 4.2.8 _______________ page 35
Valve Block	Chapter 4.2.13 ______________ page 46
Bottle Waste	Chapter 4.2.18 ______________ page 58
Wash Station WS1	Chapter 4.2.14 ______________ page 50
Wash Station WB1	Chapter 4.2.15 ______________ page 52
Wash Station WD1	Chapter 4.2.17 ______________ page 53
Wash Station WD2	Chapter 4.2.16 ______________ page 54
Water Filter	Chapter 4.2.18 ______________ page 58
Distilled Water Bottle	Chapter 4.2.11 ______________ page 43
3-Way Distributor	Chapter 4.2.12 ______________ page 45
Peltier Assy Preheater	Chapter 4.2.4 _______________ page 13
Detection Cell	Chapter 4.2.5 _______________ page 22
Waste Pump	Chapter 4.2.18 ______________ page 58
Valves	Chapter 4.2.13 ______________ page 46
Tubings	Chapter 3.2 ________________ page 9

3.1.2 General Fluidics Drawing

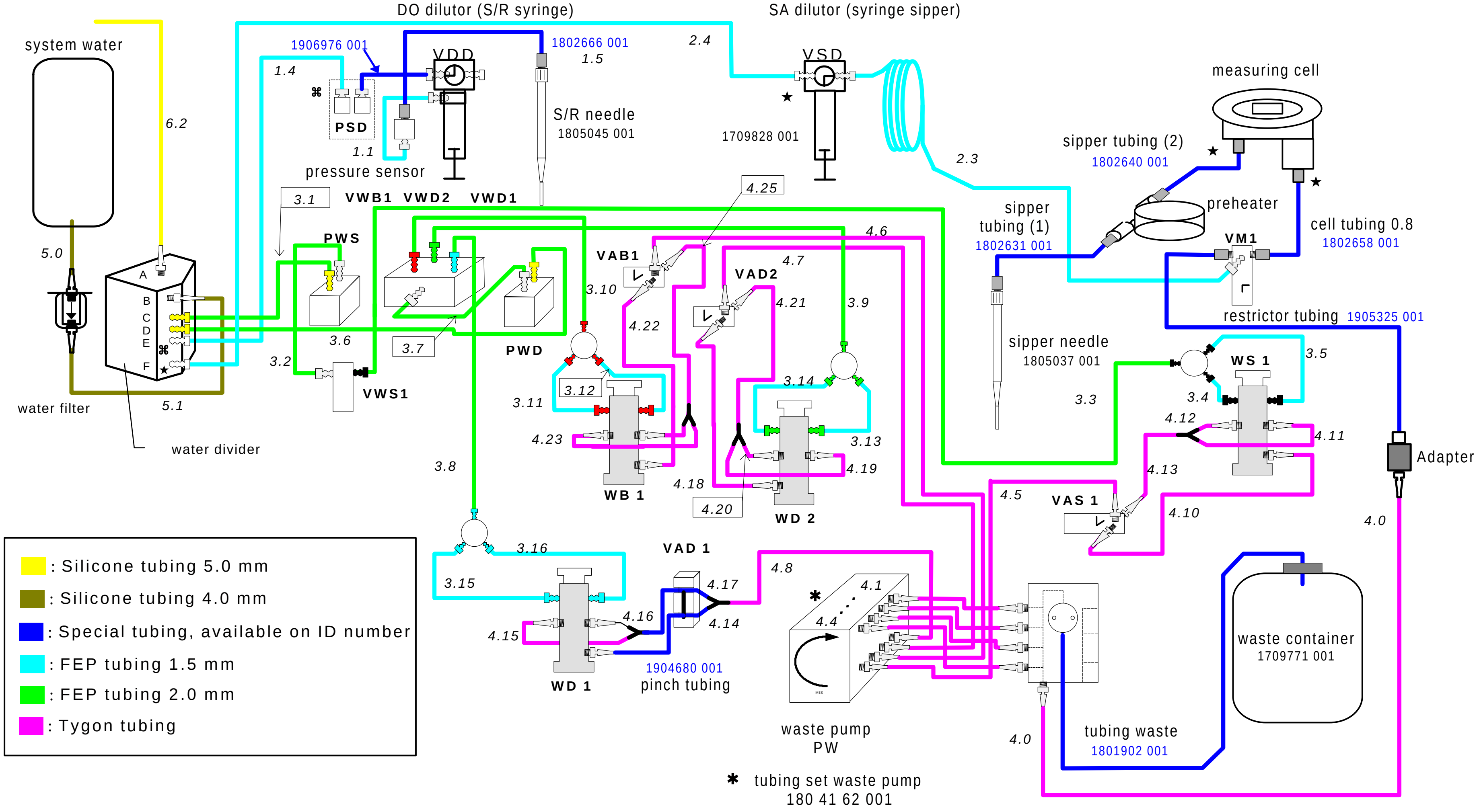

DO dilutor (S/R syringe)
SA dilutor (syringe sipper)
system water
1906976 001
VDD
1802666 001
1.5
2.4
VSD
1.4
⌘
PSD
6.2
S/R needle
1805045 001
★
1709828 001
measuring cell
1.1
pressure sensor
2.3
sipper tubing (2)
1802640 001
★
★
preheater
3.1
VWB1
VWD2
VWD1
4.25
sipper tubing (1)
1802631 001
cell tubing 0.8
1802658 001
VM1
5.0
PWS
4.6
VAB1
A
B
C
D
E
F
⌘
★
4.7
VAD2
3.10
3.6
4.21
3.9
4.22
3.7
PWD
3.2
restrictor tubing
1905325 001
sipper needle
1805037 001
WS 1
3.5
VWS1
3.12
3.11
3.14
3.4
3.3
4.12
4.23
3.13
4.11
water filter
5.1
water divider
3.8
4.18
4.19
Adapter
4.13
WB 1
4.20
WD 2
4.5
VAS 1
4.10
4.0
3.16
VAD 1
4.8
3.15
4.17
✱
4.1
4.4
4.16
4.14
4.15
WD 1
1904680 001
pinch tubing
waste container
1709771 001
waste pump
PW
tubing waste
1801902 001
4.0
✱ tubing set waste pump
180 41 62 001
🟨 : Silicone tubing 5.0 mm
🟫 : Silicone tubing 4.0 mm
🟦 : Special tubing, available on ID number
🟦 : FEP tubing 1.5 mm
🟩 : FEP tubing 2.0 mm
🟪 : Tygon tubing

Fig.LIQ_TUB

3.1.3 Feeding Pipes to Wash Stations WD 1, WD 2, WB 1

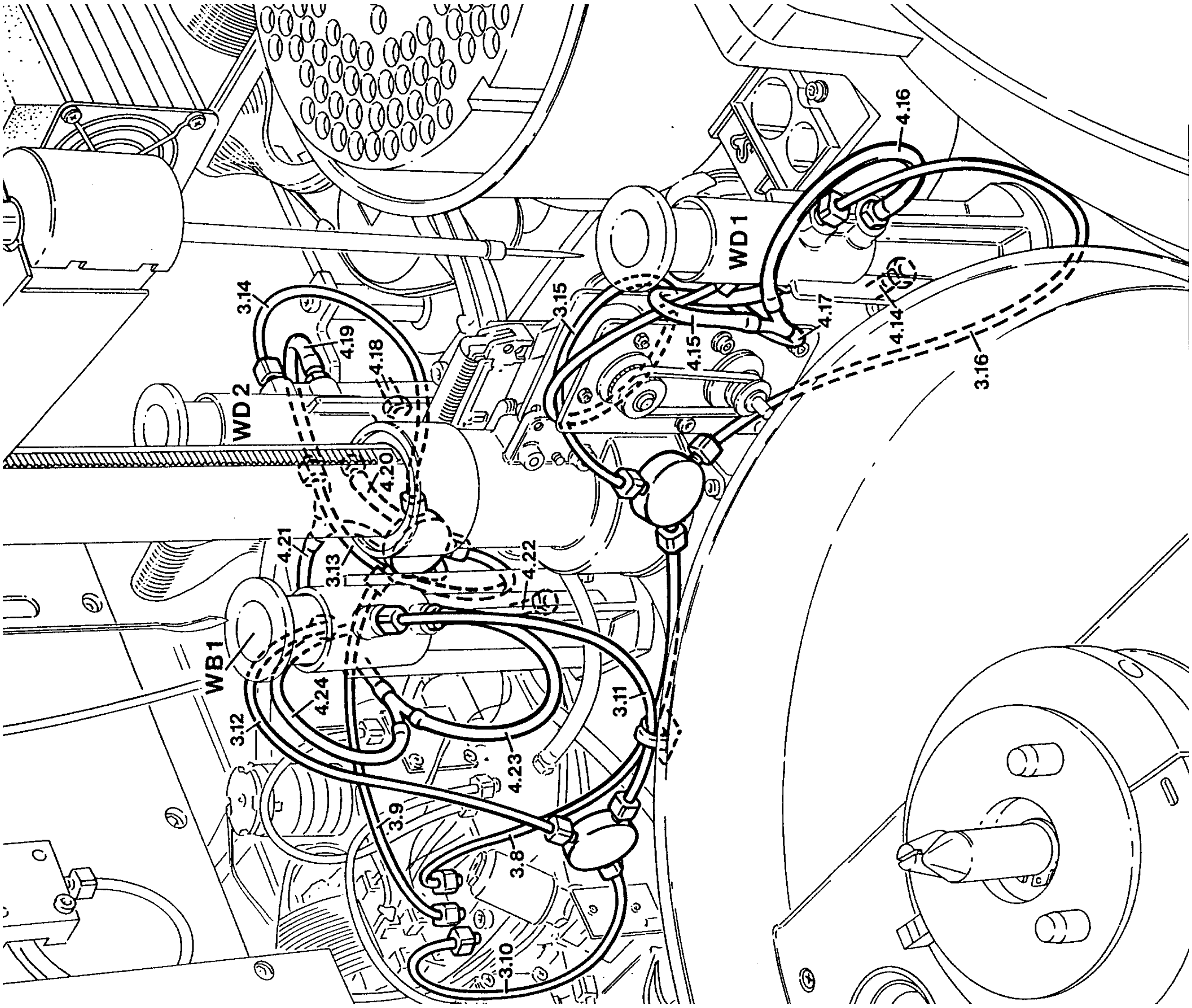

4.16
WD 1
3.14
4.19
4.18
WD 2
3.15
4.15
4.17
4.14
3.16
4.20
4.21
3.13
4.22
WB1
3.12
4.24
3.11
4.23
3.9
3.8
3.10

Fig. Fluid-3

3.1.4 Fluid Station

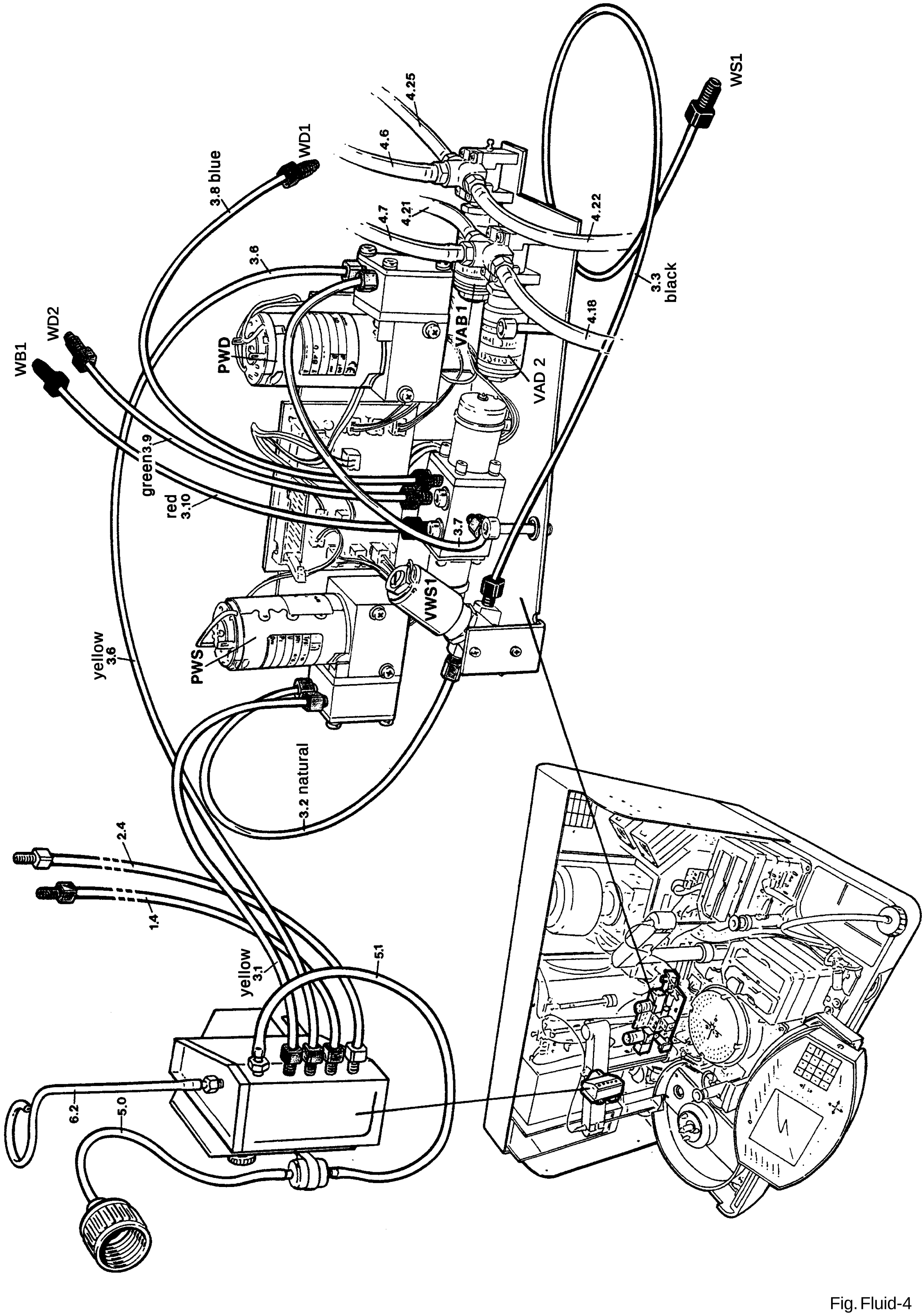

WB1
WD2
3.8 blue
WD1
4.25
4.6
4.7
4.21
4.22
3.6
PWD
VAB1
VAD 2
4.18
3.3
black
WS1
green3.9
red
3.10
3.7
VWS1
yellow
3.6
PWS
3.2 natural
2.4
1.4
yellow
3.1
5.1
6.2
5.0

Fig. Fluid-4

3.1.5 Water Supply System

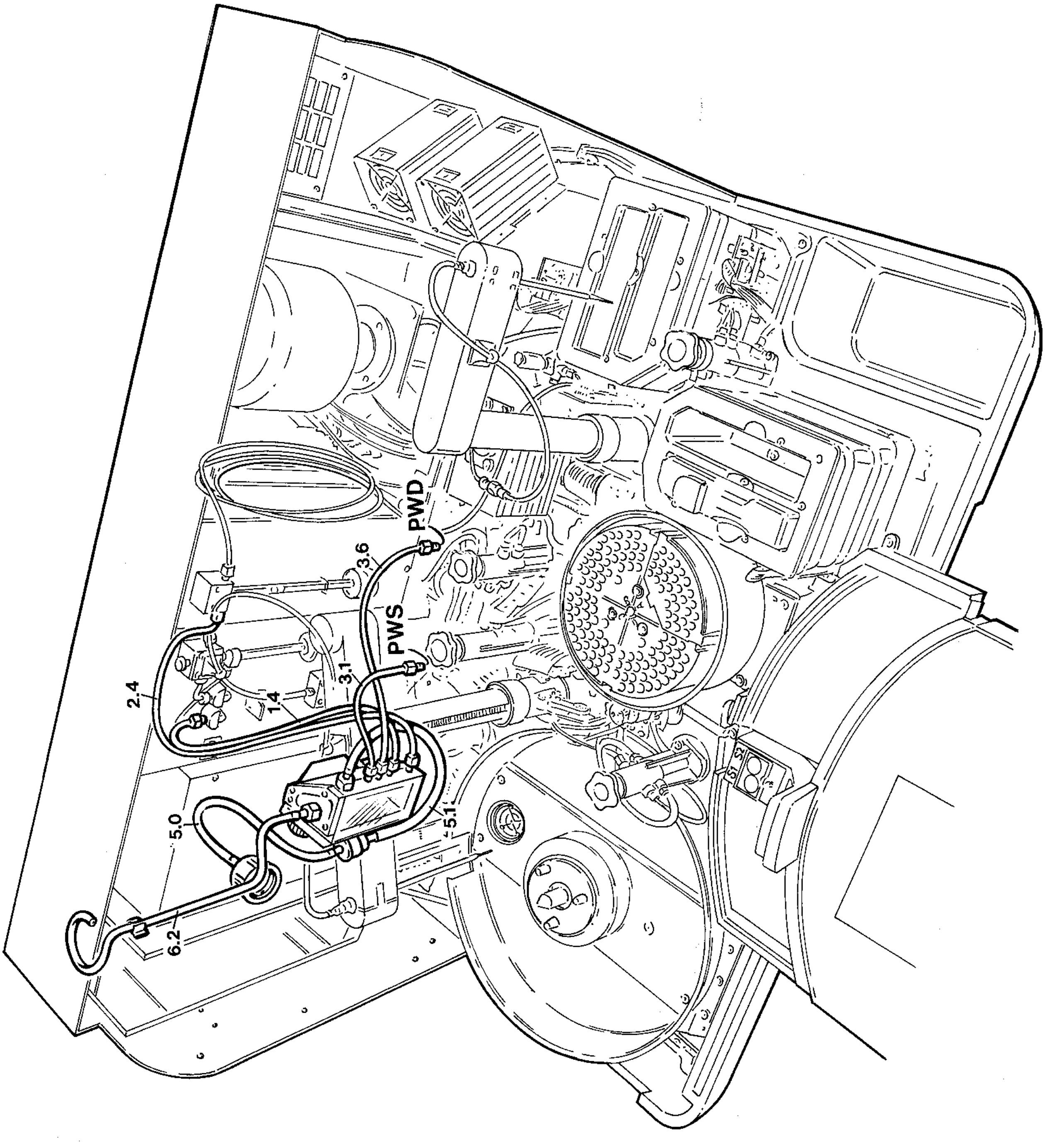

PWD
3.6
PWS
3.1
1.4
2.4
5.0
5.1
6.2
S1
S2

Fig. Fluid-8

3.1.6 Waste Tubings, Pump, Distributor, Tubing to Wash Station WS 1

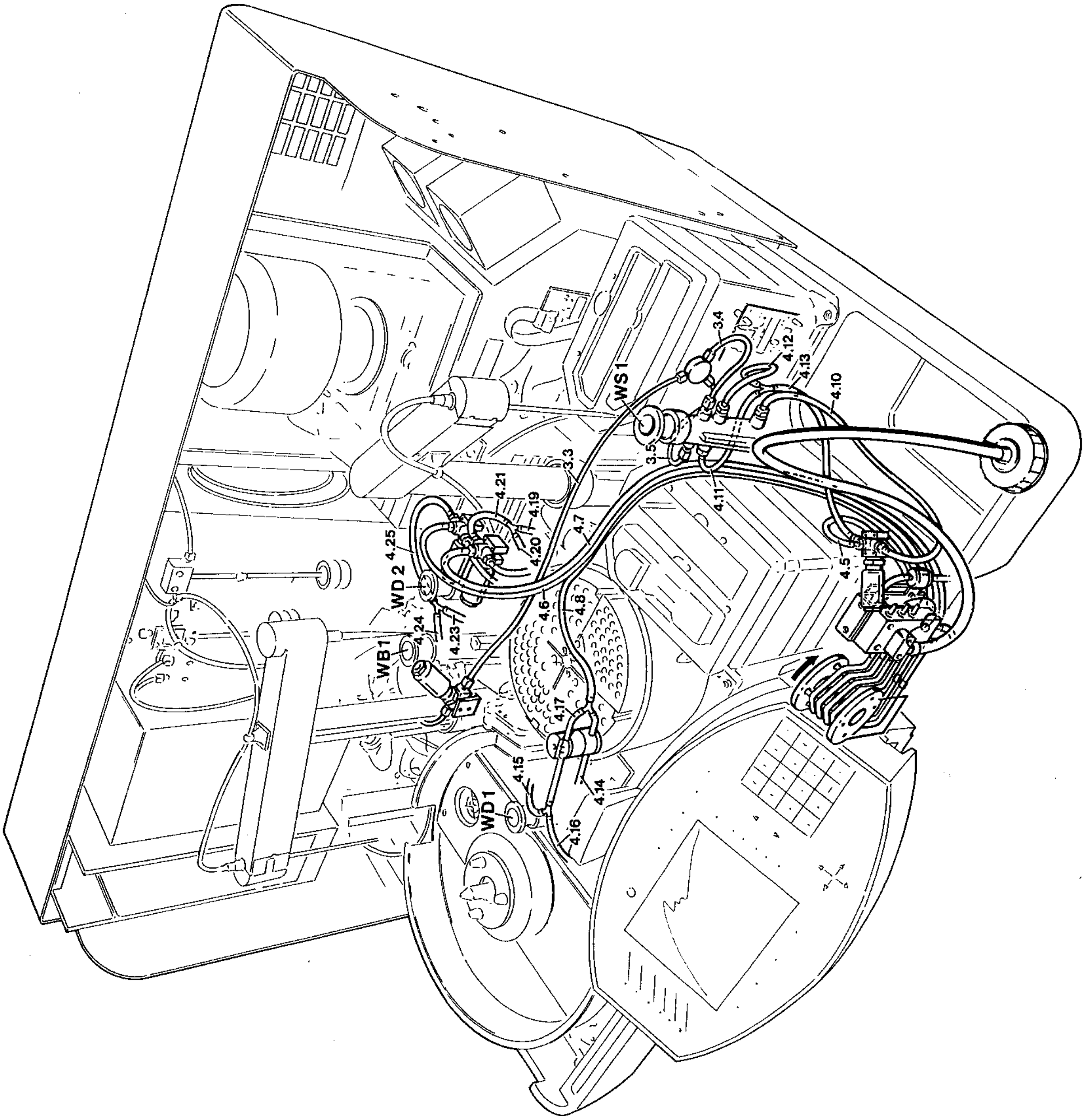

3.4
4.12
4.13
4.10
WS1
3.5
4.11
3.3
4.21
4.19
4.20
4.7
4.25
WD2
4.6
4.8
4.5
4.24
4.23
WB1
4.17
4.15
4.14
WD1
4.16

Fig. Fluid-6

3.2 Tubings

3.2.1 Legend for Fluidics Overview

3.2.1.1 Tubings System Water 1

Tubing No.	Length in mm	Ø a in mm	Ø i in mm	Color	from	to
1.1	400	3.0	1.5	natural	Pressure sensor bottom	Dilutor s/r (syringe lateral)
1.4	600	3.0	1.5	natural	Buffer Tank Output "E"	PSD (rinsing pump) DD extrem left
2.3	1.950	3.0	1.5	natural	Dilutor valvel VSD (right)	Valve VM1 (3)
2.4	650	3.0	1.5	white	Buffer Tank Output "F"	Dilutor valve VSD (left)
3.4	120	3.0	1.5	black	Wash station WS1	Y-piece
3.5	120	3.0	1.5	black	Wash station WS1	Y-piece
3.11	200	3.0	1.5	red	Wash station WB1	Y-piece
3.12	200	3.0	1.5	red	Wash station WB1	Y-piece
3.13	200	3.0	1.5	green	Wash station WD1	Y-piece
3.14	200	3.0	1.5	green	Wash station WD1	Y-piece
3.15	300	3.0	1.5	blue	Wash station WD1	Y-piece
3.16	300	3.0	1.5	blue	Wash station WD1	Y-piece

3.2.1.2 Tubings System Water 2

Tubing No.	Length in mm	Ø a in mm	Ø i in mm	Color	from	to
3.1	150	3.0	2.0	yellow	Buffer Tank Output "C"	Pump PWS entrance
3.2	200	3.0	2.0	natural	Pump PWS exit	Valve VWS1
3.3	600	3.0	2.0	black	Valve VWS1	Y-piece WS1
3.6	400	3.0	2.0	yellow	Buffer Tank Output "D"	Pump PWD entrance
3.7	200	3.0	2.0	natural	Pump PWD exit	Valve block s/r system (front)
3.8	300	3.0	2.0	blue	Y-piece WD1	Valve block VWD1 (right)
3.9	200	3.0	2.0	green	Y-piece WD2	Valve block VWD2 (center)
3.10	200	3.0	2.0	red	Y-piece WB1	Valve block VWB1 (back)

3.2.1.3 Tubings Waste

Tubing No.	Length in mm	Ø o in mm	Ø i in mm	Color	from	to
4.0	600	6.0	3.0		Valve VM1 (2)	Collector waste (bottom left)
4.1	100	6.0	3.0		Waste pump top	Collector waste (right)
4.2	100	6.0	3.0		Waste pump top	Collector waste (right)
4.3	100	6.0	3.0		Waste pump top	Collector waste (right)
4.4	100	6.0	3.0		Waste pump top	Collector waste (right)
4.5	350	6.0	3.0		Valve VAS 1 (3)	Waste pump
4.6	1000	6.0	3.0		Valve VAB 1 (3)	Waste pump
4.7	1000	6.0	3.0		Valve VAD 2 (3)	Waste pump
4.8	750	6.0	3.0		Y-piece A pinch valve	Waste pump
4.10	350	6.0	3.0		Wash station WS1 waste bottom	Valve VAS 1 (2)
4.11	90	6.0	3.0		Wash station WS1 waste top	Y-piece B
4.12	90	6.0	3.0		Wash station WS1 waste top	Y-piece B
4.13	200	6.0	3.0		Y-piece B	Valve VAS1 (1)
4.14	100	6.0	3.0		Wash station WD1 waste bottom	Y-piece A through VAD1
4.15	100	6.0	3.0		Wash station WD1 waste top	Y-piece C
4.16	100	6.0	3.0		Wash station WD1 waste top	Y-piece C
4.17	140	6.0	3.0		Y-piece C	Y-piece A through VAD1
4.18	90	6.0	3.0		Wash station WD2 waste	Valve VAD2 (2)
4.19	90	6.0	3.0		Wash station WD2 waste top	Y-piece D
4.20	90	6.0	3.0		Wash station WD2 waste top	Y-piece D
4.21	90	6.0	3.0		Y-piece D	Valve VAD2 (1)
4.22	90	6.0	3.0		Wash station WB1 waste bottom	Valve VAB1 (2)
4.23	200	6.0	3.0		Wash station WB1 waste top	Y-piece E
4.24	200	6.0	3.0		Wash station WB1 waste top	Y-piece E
4.25	200	6.0	3.0		Y-piece E	Valve VAB1 (1)

3.2.1.4 Tubing Water Supply

Tubing No.	Length in mm	Ø o in mm	Ø i in mm	Color	from	to
5.0	250	6.0	3.0		System Bottle	Filter Input
5.1	300	6.0	3.0		Filter Output	Buffer Tank Input "B"
6.2	400	8.0	5.0		Buffer Tank Output "A"	between electronic rack/ water bottle housing

3.2.2 Connections

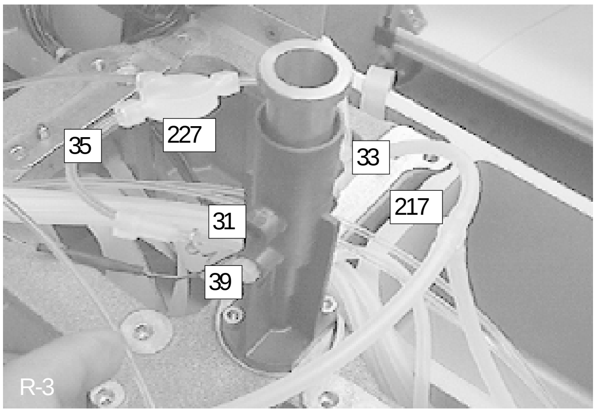
The tubings laid in the analyzer have two different kinds of connections.

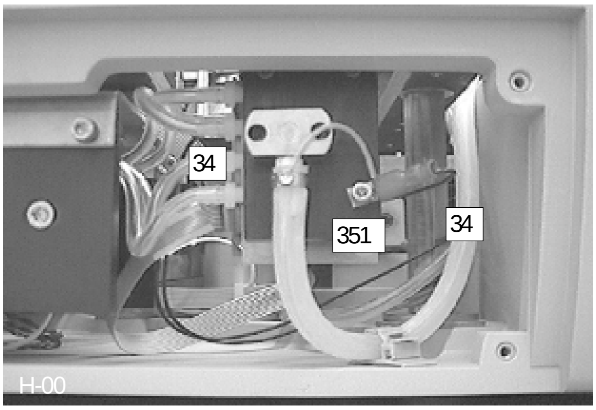
- Connection with adapter.
- Connection with fitting.

For the connection with fitting a special tool, flange kit for tubings (403), is required; see chapter 8.1 Special Tools. By using this tool a flange is bent up at the tubing end.

Note!
Empty the fluidics system before servicing;
see chapter 6 Software.
Prime the fluidics system after servicing;
see chapter 6 Software.

3.2.3 Location





31	Adapter
33	Fitting, red, yellow, green
34	Water/Waste tubing
35	Tubing, normal, part of Set 5
36	Water feeding tubing, part of Set 5
39	Fitting
217	Y-piece
227	Y-piece
351	Tubing Waste
410	Tubing s/r
411	Tubing cell
412	Tubing sipper (2)
413	Tubing sipper (1)

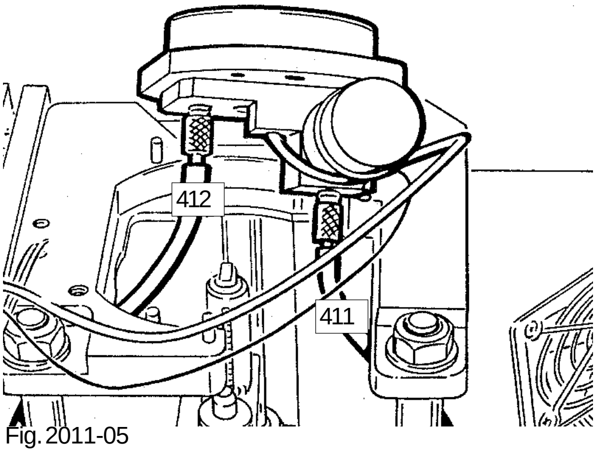
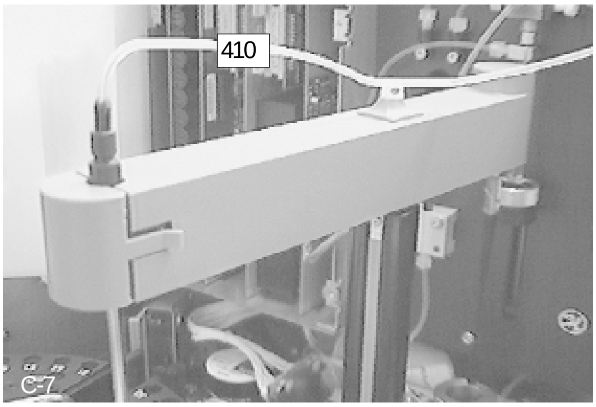
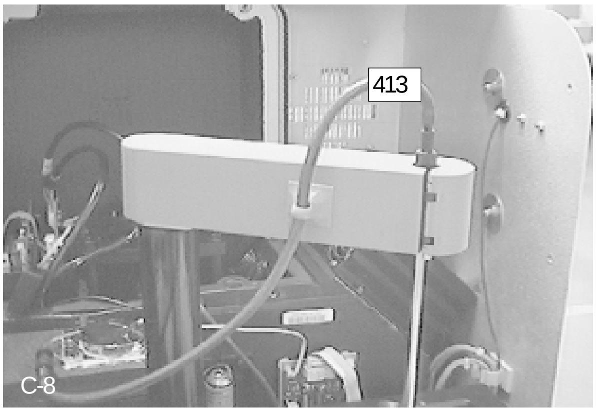


Fig. 2011-05





3.2.4 Service Procedures

Exchangeable components:

- Tubing s/r (410)
- Tubing cell (411)
- Tubing sipper (2) (412)
- Tubing sipper (1) (413)

- Tubing set (Set 5), consisting of:
    - Adapter (31)
    - Fitting, red, yellow, green (33)
    - Waste tubing (34)
    - Tubing, normal (35)
    - Water feeding tubing (36)
    - Fitting blank (39)
    - Y-piece (217)
    - Y-piece (227

4 Mechanics

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4.1 Mechanical System Overview

Housing, Chapter 4.2.1

- Power Supply Assy (1)
- PCB Motherboard (2)
- PCB Dist Voltage (4)
- PCB Temp Module B3 (46)
- PCB Clot Detection Module B7 (73)
- Grounding Contact Set (171)
- Instrument Base Assy (204)
- Instrument Back Assy (205)
- Instrument Feet (206)
- Fan Assy Instrument Base (208)
- Fan Assy Electr. Rack/Incubator (352)
- Microswitch (353)
- Housing Lifting Spring (354)
- Microswitch (355)
- Cap (356), included in Set 3, see Chapter 8
- Instrument Cover Top (359)
- Instrument Housing Top (360)
- Cover Inside (362)
- MFA Housing Insert (366)
- Filter Cloth (371), included in Set 2, see Chapter 8
- PCB Controller (400)
- Cover Insert (401)
- Housing Bottom (404)
- Housing Flap (407)
- Fuse holder (422), included in Set 3, see Chapter 8
- Cable PC9 (424)
- Fuse 1.6A, 10 pcs. (509), included in Set 7, see Chapter 8
- Fuse 1.15A, 10 pcs. (510), included in Set 7, see Chapter 8
- Cable NT1 (529)

Keyboard Assy, Chapter 4.2.2

- Photo Coupler Keyboard (71)
- Magnet Keyboard (72)
- Keyboard Assy (128)
- Keyboard Housing (174)
- Keyboard Mounting Plate (175)
- Bearing Keyboard (176)
- Keyboard Slider (414)
- Cable FL1 (514)

STAT Holder, Chapter 4.2.3

- Tube Holder STAT (172)
- STAT Holder (173)

Detection Module, Chapter 4.2.4

- PCB Preamp Temperature (40)
- Magnet Valve Assy VAD2/VAB1 (114)
- Peltier Assy Detection Module (301)
- Peltier Assy Preheater (302)
- Preheater Sipper (306)
- PCB Preamp High Voltage (310)
- Cable M1/M4 (314), included in Set 1, see Chapter 8
- Cable M2 (315), included in Set 1, see Chapter 8
- Cable M5 (317), included in Set 1, see Chapter 8
- PCB Potentiostat/Motor (318)
- PCB Detection Module B1 (320)
- PCB Dist Detection Module (322)
- Motor Magnet Drive (325)
- Cable M9 (338)
- Cable M10 (527), included in Set 1, see Chapter 8

- Photomultiplier (312) consisting of:
  - PMT (121)
  - PCB Preamp High Voltage (310)
  - Detection Preamplifier (311)
  - Compression Spring (313)
  - Screw-cap (329)
  - Eccentric Ring (417)

- Holder Photo Coupler LD1 (326) consisting of:
  - Photo Coupler Holder (327)
  - Photo Coupler Assy (418)
  - Photo Coupler Holder (419)

- Holder Magnet Assy (409) consisting of:
  - Magnet Holder Assy (9)
  - XY Adjusting Tool for Magnet (37)

- PCB Controller (400)
- Tubing Cell 0.8 (411)
- Tubing Sipper (2) 0.8 (412)

Cell and Reference Electrode, Chapter 4.2.5

- Cell and Ref Electrode (323)

Multi Functional Arm (MFA), Chapter 4.2.6

- MFA Assy (209)
- Cable D61 (212)
- Stepping Motor PX244 (MFA) (383)
- Stepping Motor PK244 (MFA) (384)
- PCB Dist MFA (385)
- Tooth Belt (MFA) (386)
- Cable (MFA) (388)
- Hall Sensor (MFA) (405)
- Cable S51 (524)

S/R Arm, Chapter 4.2.7

- PCB LLD S/R (78)
- PCB Preamp LLD S/R (79)
- Contact Needle (91)
- Motor Assy Bead Mixer (93)
- Switch Sipper (113)
- Arm S/R (181)
- Holder Sipper Needle (182)
- Holder Bead Mixer (183)
- Bead Mixer (184)
- Needle S/R (185)
- Cable Preamp Sipper (186)
- Spring (192)
- Switch Sipper (220)
- Spring Holder (234)
- Needle Holder (244)
- Cover S/R Arm (245)
- Tubing S/R 1.5 (410)

Sipper Arm, Chapter 4.2.8

- Contact Needle (91)
- PCB LLD Sipper (100)
- PCB Preamp LLD Sipper (101)
- Switch Sipper (113)
- Needle Holder (182)
- Cable Preamp Sipper (186)
- Arm Sipper (188)
- Needle Sipper (189)
- Spring (192)
- Cover Sipper Arm (203)
- Spring Holder (234)
- Needle Holder (244)
- Tubing Sipper (1) 0.8 (413)

Dilutors, Chapter 4.2.9

- PCB Dilutor Reagent BP5 (76)
- PCB Dilutor Sample BP2 (97)
- Dilutor Assy S/R (193)
- Dilutor Assy Sipper (194)
- Syringe Sipper (195)
- Photosensor Dilutor (211)
- Syringe S/R (230)
- Valve Motor Dilutor (231)
- Valve Dilutor 3-2 (233)
- Pump Sample Dilutor (235)
- Stepping Motor Z29 (236)
- Stepping Motor Z30 (237)
- PCB Controller (400)
- Photosensor Dilutor (423)
- Tooth Belt 125 Dilutor (425)
- Tooth Belt 87 Dilutor (426)
- Cable D6 (513)
- Cable S5 (523)

Pressure Sensor, Chapter 4.2.10

- Housing Pressure Sensor (74)
- Pressure Sensor Assy (75)

Water Supply Module, Chapter 4.2.11

- Water Valve Instrument Side (145)
- Water Valve Bottle Side (346)
- Water Bottle Housing (347)
- Distilled Water Bottle (506) included in Set 2, see Chapter 8

Buffer Tank, Chapter 4.2.12

- Filter CT Wash system SET2 (502)
- Buffer Tank (543)

Pumps and Valves, Chapter 4.2.13

- Membrane Pump PWS/PWD (23)
- Waste Pump (24)
- Membrane Pump PWS/PWD (25)
- Magnet Valve VAS1/VM1 (26)
- Magnet Valve 3-Way B1/D2/D1 (27)
- Magnet Valve 3-Way B1/D2/D1 (28)
- Magnet Valve 3-Way B1/D2/D1 (29)
- Magnet Valve VWS1 (30)
- Magnet Valve Assy VAD2/VAB1 (32)
- Magnet Valve Assy VAD2/VAB1 (114)
- Pinch Valve VAD1 (115)
- Pump Sample Dilutor (235)
- Valve Dilutor 3-2 (233)
- Magnet Valve Assy VAD2/VAB1 (391)
- Pinch Tubing(544) (is alos included in Set 2, see Chapter 8)

Wash Station S, Chapter 4.2.14

- Insert Wash Station D1/D2/S (402)
- Wash Station S (216)
- Y-Piece (217) included in Set 5, see Chapter 8
- Y-Piece (227) included in Set 5, see Chapter 8
- O-Ring (504) included in Set 2, see Chapter 8

Wash Station Bead Mixer, Chapter 4.2.15

- Insert Wash Station B (218)
- Wash Station B (219)
- Y-Piece (217) included in Set 5, see Chapter 8
- Y-Piece (227) included in Set 5, see Chapter 8
- O-Ring (505) included in Set 2, see Chapter 8

Wash Station D2, Chapter 4.2.16

- Insert Wash Station D1/D2/S (215)
- Wash Station D1/D2 (421)
- Y-Piece (217) included in Set 5, see Chapter 8
- Y-Piece (227) included in Set 5, see Chapter 8
- O-Ring (504) included in Set 2, see Chapter 8

Wash Station D1, Chapter 4.2.17

- Insert Wash Station D1/D2/S (215)
- Wash Station D1/D2 (421)
- Y-Piece (217) included in Set 5, see Chapter 8
- Y-Piece (227) included in Set 5, see Chapter 8
- O-Ring (504) included in Set 2, see Chapter 8
- Pinch Tubing (544) (is also included in Ste 2, see Chapter 8)

Waste Module, Chapter 4.2.18

- Waste Pump (24)
- Waste/Water Distributor (214)
- PCB Waste Level (223)
- Tubing Waste (351)
- Bottle Waste (361)
- O-Ring Waste (501) included in Set 2, see Chapter 8
- Tubing Waste Pump (503) included in Set 2, see Chapter 8

Incubator Drive, Chapter 4.2.19

- Stepping Motor Incubator Drive (17)
- Fan Assy Electr. Rack/Incubator (14)
- Tooth Belt Incubator Drive (154)
- Photo Coupler Incubator Drive (18)
- Photo Coupler Incubator Drive (19)
- Photo Coupler Incubator Drive (20)
- Photo Coupler Incubator Drive (21)
- Photo Coupler Incubator Segment (44)
- Incubation Rotor Assy (148)
- PCB Dist Rotor/Rotor (8)
- Cable R2 (521)

- Cable Incubator Heater (22) consisting of:
  - Plug (507)
  - Cable Incubator Heater (508)

Sample/Reagent Rotor Drive, Chapter 4.2.20

- PCB Rotor/Rotor Module B4 (6)
- PCB Dist Rotor/Rotor (7)
- Stepping Motor S/R Drive (10)
- Photo Coupler S/R Drive (11)
- Photo Coupler S/R Drive (12)
- Photo Coupler S/R Drive (13)
- Fan Assy S/R Drive (15)
- Photo Coupler S/R Tray (16)
- BCR Assy (125)
- Spring S/R Drive (138)
- Tooth Belt S/R Drive (139)
- S/R Rotor Assy (140)
- PCB Controller (400)
- Plastic Housing S/R Rotor 1 (415)
- Cable R1 (520)

Bottle Temperature Assy, Chapter 4.2.21

- Adhesive for Temperature Sensor (3) included in Set 4, see Chapter 8
- Hardener (5) included in Set 5, see Chapter 8
- PCB Preamp Temperature (47)
- Bottle Temperature Assy (143)
- Top Plate Bottle Temp (198)
- Peltier Assy Bottle Temp (55)
- Bottle Housing (199)
- Cable T1 (525)
- Cable T2 (526)

OEM Master, Chapter 4.2.22

- PCB Dist Keyboard (53)
- PCB OEM Master (129)
- Grounding Contact Set (171)
- Cable PC10 (515)
- Cable PC2 (516)
- Cable PC8 (517)
- Cable PC6 (518)
- Cable PC3 (519)
- Cable PC1 (528)
- Flat Cable set Keyb. OEM Master (545)

Floppy Drive, Chapter 4.2.23

- Floppy Drive (127)
- Grounding Contact Set (171)

Printer, Chapter 4.2.24

- Plate Printer (166) consisting of:
  - Diffusion Disk (511)
  - Key Button (512)

- Printer (126)
- Grounding Contact Set (171)

Fluidics, Chapter 3

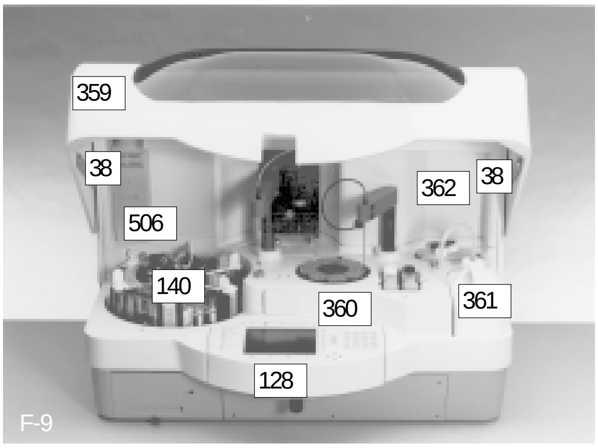
Service Procedures, Chapter 3.2.4

Replaceable Components:

Set 5 consisting of:
  - Adapter (31)
  - Fittings, red, yellow, green (33)
  - Waste Tubing (34)
  - Tubing (35)
  - Water Supply Tubing (36)
  - Fitting blank (39)
  - Y-Piece (217)
  - Y-Piece (227)

4.1.1 Removing of the Instrument Cover Top and Instrument Housing Top

4.1.1.1 Location


359
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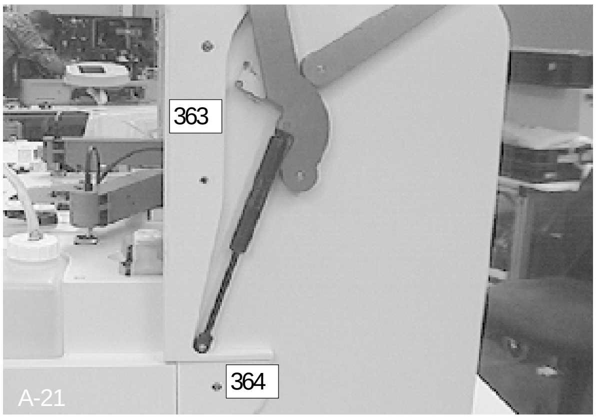
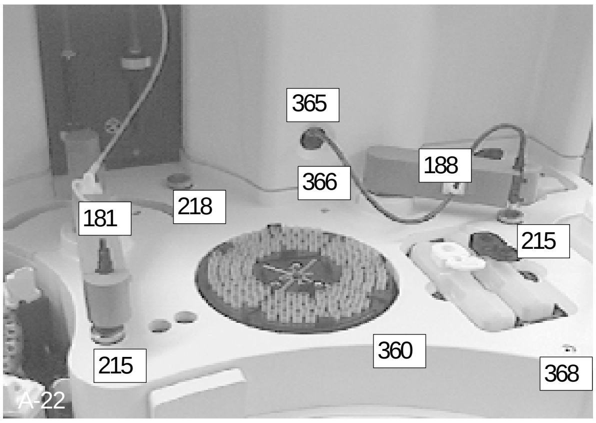
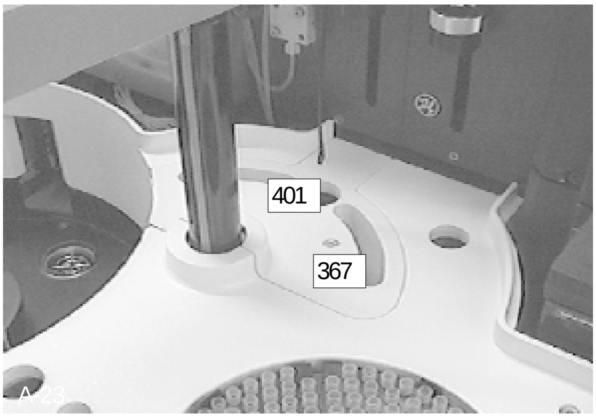
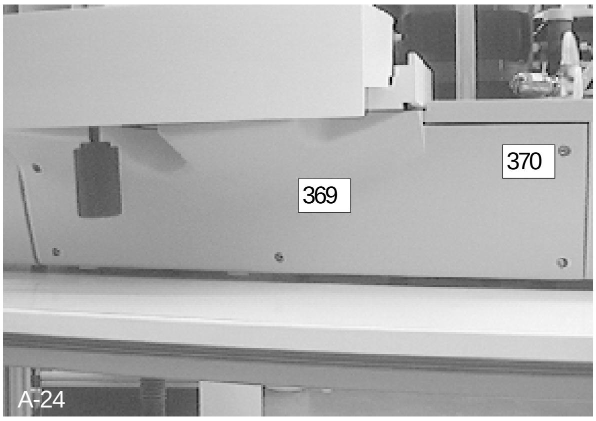
F-9

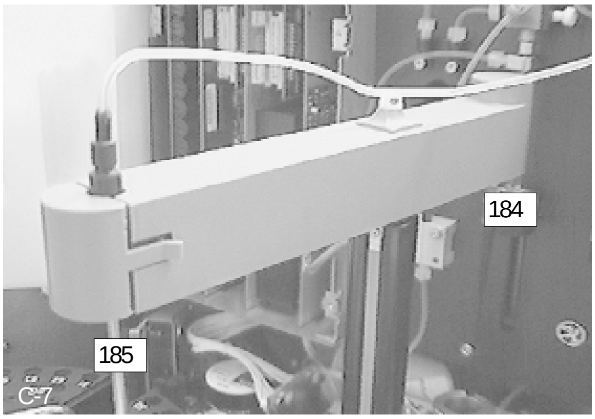



365
188
366
181
218
215
215
360
368
A-22

38	Screws
128	Keyboard Assy
140	S/R Rotor Assy
181	Arm S/R
184	Bead Mixer
185	Needle S/R
188	Arm Sipper
215	Insert Wash Station D1/D2
218	Insert Wash Station B
359	Instrument Cover Top
360	Instrument Housing Top
361	Bottle Waste
362	Cover Inside
363	Side Wall







364	Screw
365	Tubing Connection
366	MFA Housing Insert
367	Screw
368	Screw
369	Front Panel
370	Screw
401	Cover Insert
506	Distilled Water Bottle

4.1.1.2 Service Procedures

Dismounting the Cover:

In order to avoid damage, it is recommended to have two persons to hold the cover on the left and right while dismounting.

- Open the Instrument Cover Top (359).
- Loosen the screws (38) of the Cover Top Inside.
- Remove the Instrument Cover Top (359) by lifting.

Dismounting the Side Walls:

- Loosen the screws (364).
- Remove the Side Walls (363).

Dismounting the Cover Inside:

- Remove the Distilled Water Bottle (506).
- Manually position the S/R Arm (181) and Sipper Arm (188) in the front wash stations.
- Undo the Tubing Connection (365).
- Remove the Cover Inside (362).

Dismounting the MFA Housing Insert and Instrument Housing Top:

- Pull the S/R Arm (181) and Sipper Arm (188) out of the wash stations by hand.
- Unscrew the Inserts Wash Station D1/D2/S (215) and (218) from all wash stations.
- Remove the S/R Rotor Assy (140).
- Loosen screw (367).
- Remove the MFA Housing Insert (366) by pulling it upward.
- Unscrew the Bead Mixer (184).
- Dismount the S/R Needle (185), see 4.2.7.
- Dismount the Sipper Arm (188), see 4.2.8.
- Remove the Waste Bottle (361).
- Pull the Keyboard Assy (128) out to the front.
- Loosen the screws (368).
- Remove the Instrument Housing Top (360).

Dismounting the Front Panel:

- Loosen the screws (370).
- Remove the Front Panel (369).

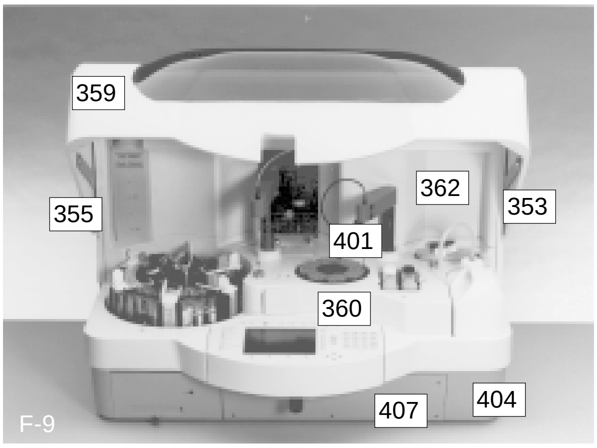
4.2 Mechanical Modules

4.2.1 Housing

4.2.1.1 General Description

NA

4.2.1.2 Location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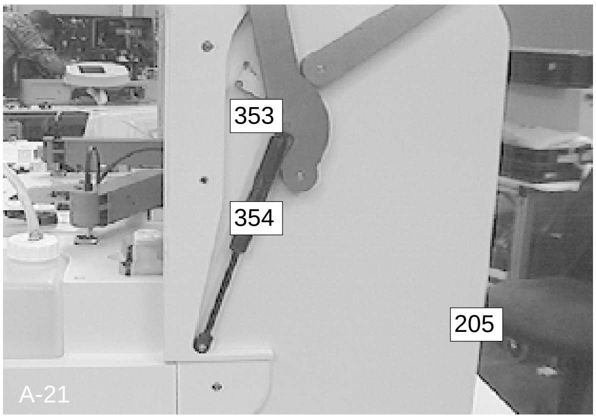
F-9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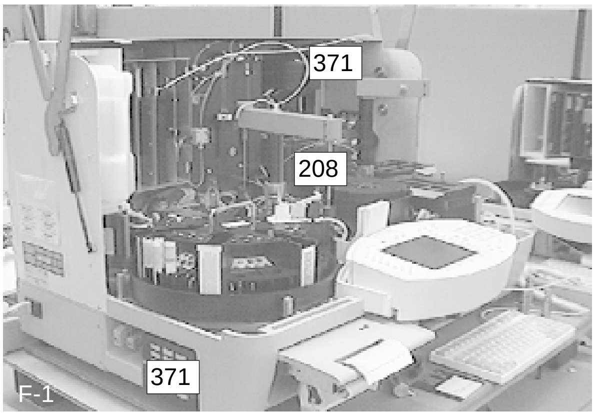
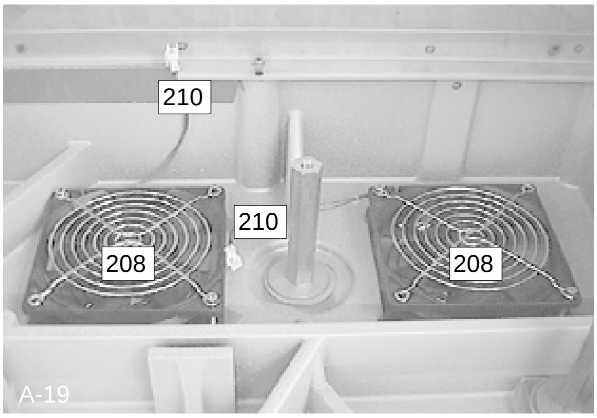

371
208
371
F-1

1	Power Supply Assy
171	Grounding Contact Set
205	Instrument Back Assy
208	Fan Assy Instrument Base
210	Cable Connector
353	Microswitch
354	Housing Lifting Spring
355	Microswitch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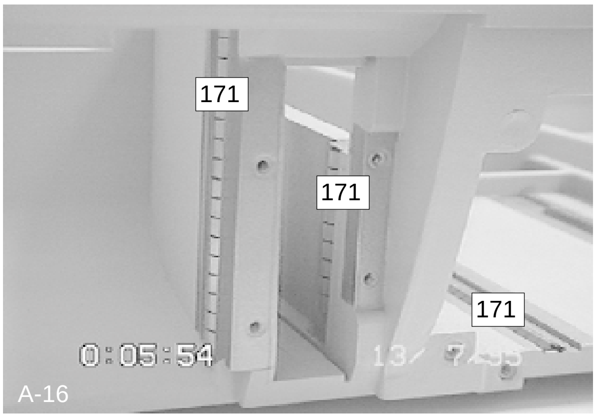
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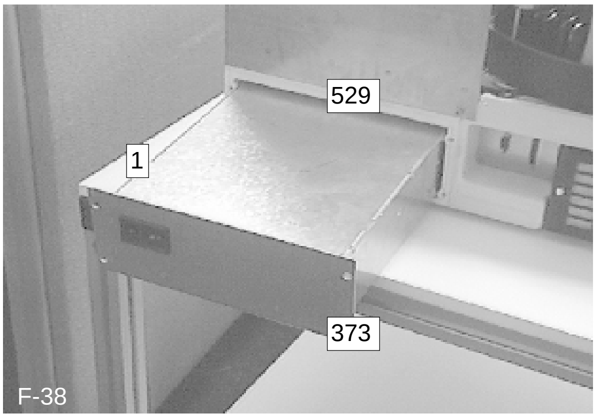
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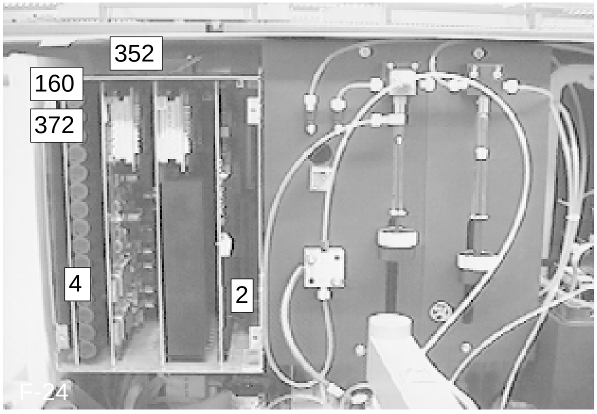
F-38

359	Instrument Cover Top
360	Instrument Housing Top
362	Cover Inside
371	Filter Cloth
373	Screw
401	Cover Insert
404	Housing Bottom
407	Housing Flap
529	Cable NT1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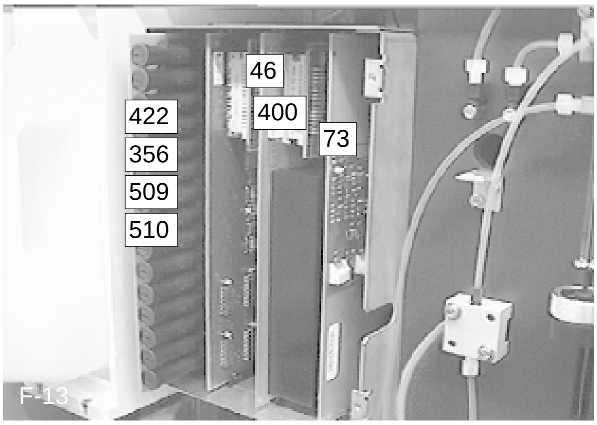
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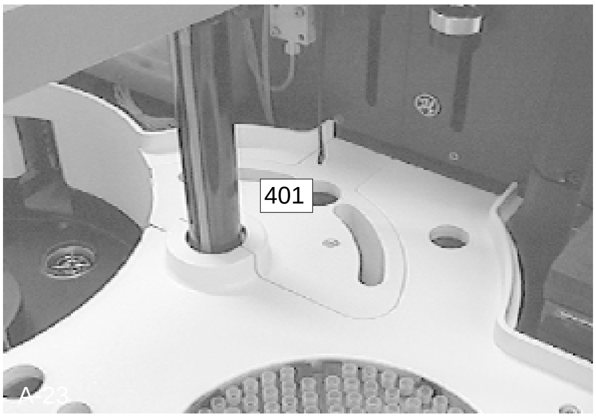

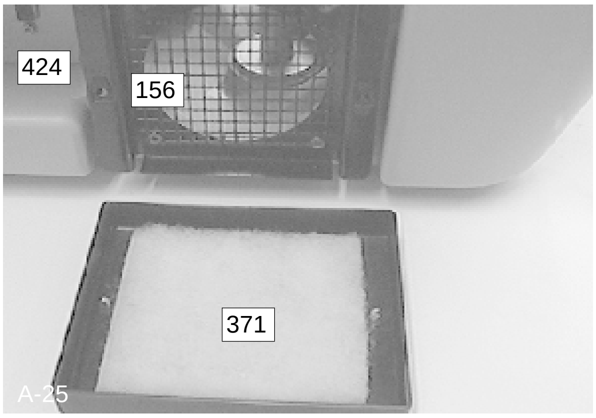
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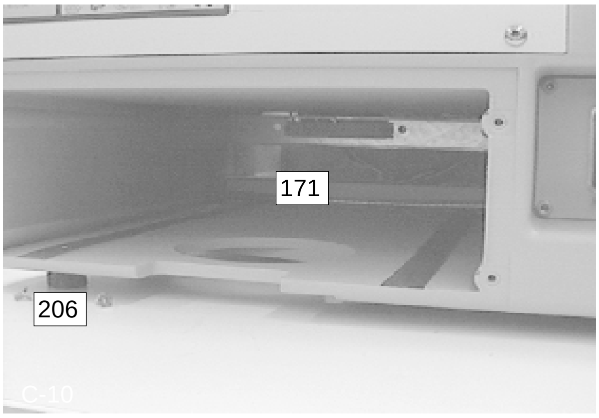
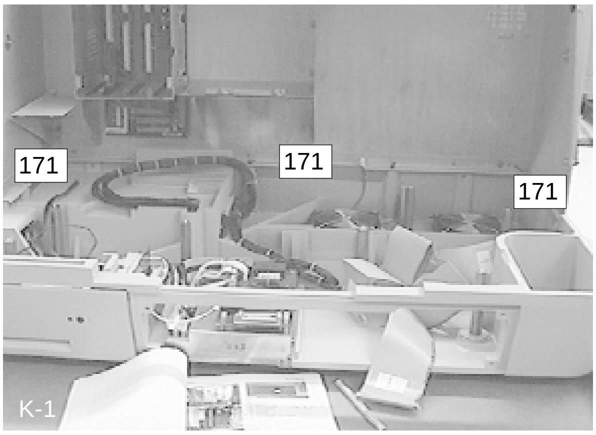



171
171
171
K-1

2	PCB Mother Board
4	PCB Dist Voltage
46	PCB Temp Module B3
73	PCB Clot Detection Module B7
156	Air Intake Filter
160	Electronic Rack
171	Grounding Contact Set
206	Instrument Feet
352	Fan Assy Electronic Rack
356	Cap
371	Filter Cloth
372	Cover
400	PCB Controller, located on B3
401	Cover Insert
422	Fuse Holder
424	Cable PC9, behind the interface
509	Fuse 1.6A
510	Fuse 1.15A

4.2.1.3 Functional Description

NA

4.2.1.4 Tubings

For servicing the tubings, see Chapter 3 Fluidics.

4.2.1.5 Service Procedures

Replaceable Components:

- Power Supply Assy (1)
- PCB Mother Board (2)
- PCB Dist Voltage (4)
- PCB Temp Module B3 (46)
- PCB Clot Detection Module B7 (73)
- Grounding Contact Set (171)

- Instrument Base Assy (204)
- Instrument Back Assy (205)
- Instrument Feet (206)
- Fan Assy Instrument Base (208)
- Fan Assy Electr. Rack/Incubator (352)
- Microswitch (353)
- Housing Lifting Spring (354)
- Microswitch (355)
- Cap (356), included in Set 3, see Chapter 8 Spare Parts
- Instrument Cover Top (359)
- Instrument Housing Top (360)
- Cover Inside (362)
- MFA Housing Insert (366)
- Filter Cloth (371), included in Set 2, see Chapter 8 Spare Parts
- PCB Controller (400), located on B3
- Cover Insert (401)
- Housing Bottom (404)
- Housing Flap (407)
- Fuse Holder (422), included in Set 3, see Chapter 8 Spare Parts
- Cable PC9 (424)
- Fuse 1.6A, 10 pcs. (509), included in Set 7, see Chapter 8 Spare Parts
- Fuse 1.15A, 10 pcs. (510), included in Set 7, see Chapter 8 Spare Parts
- Cable NT1 (529)

Dismounting the Electronic Rack:

Preparatory Work:

- Dismount the S/R Rotor Drive, see 4.2.20
- Dismount the Water Bottle Housing, see 4.2.11
- Remove both dilutors, see 4.2.9

Servicing the Electronic Rack:

- Open the Cover (372).
- Disconnect the plug of the pressure sensor from the PCB.
- Disconnect the plug of the voltage distribution from the PCB.
- Pull the PCBs out to the front.
- Disconnect all cables from the mother board.
- Unscrew the Electronic Rack (160).

Dismounting the Power Supply Assy:

- Loosen the screws (373).
- Pull the Power Supply Assy (1) out to the front.

Dismounting the Fan Assy Electronic Rack

- Open the Cover (372).
- Disconnect the plug of the pressure sensor from the PCB.
- Disconnect the plug of the voltage distribution from the PCB.
- Pull the PCBs out to the front.
- Disconnect the plug from the Fan Assy Electr. Rack/ Incubator (352).
- Dismount the Fan Assy Electr. Rack/Incubator (352) and remove by lifting it upward.

Dismounting the Air Intake Filter:

Two air intake filters (156) prevent dirt and dust from entering the instrument.
Dirty Filter Cloths (371) may be cleaned or replaced; the filter cloths are dishwasher-proof.

Dismounting the Fan Assy Instrument Base:

Preparatory Work:

- Dismount the Bottle Temperature Assy, see 4.2.21
- Dismount the MFA Sipper Side, see 4.2.6
- Remove the Waste Bottle, see 4.2.18
- Dismount the Incubator Drive, see 4.2.19
- Dismount the Detection Module, see 4.2.4

Servicing the Fan Assy Instrument Base:

- Disconnect the Cable Connector (210).
- Dismount the Fan Assy Instrument Base (208).
- ***NOTE: Take care of the direction of arrow when remounting. The arrow should point downwards.***

Dismounting the Instrument Feet

The Instrument Feet (206) are screwed from below.

Dismounting the Grounding Contact Set:

All grounding contact sets are fixed with adhesive.

- Loosen the Grounding Contact Set (171).
- Cut the new Grounding Contact Set to the appropriate length.
- Fix with adhesive.

4.2.1.6 Wiring

For servicing the electrical components, see Chapter 5 Electronics.

4.2.1.7 Additional Notes

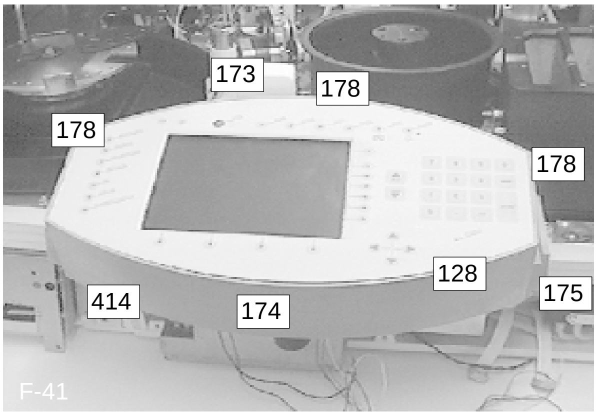
4.2.2 Keyboard Assy

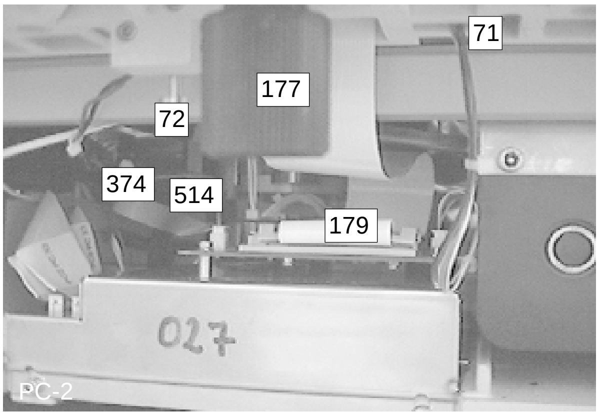
4.2.2.1 General Description

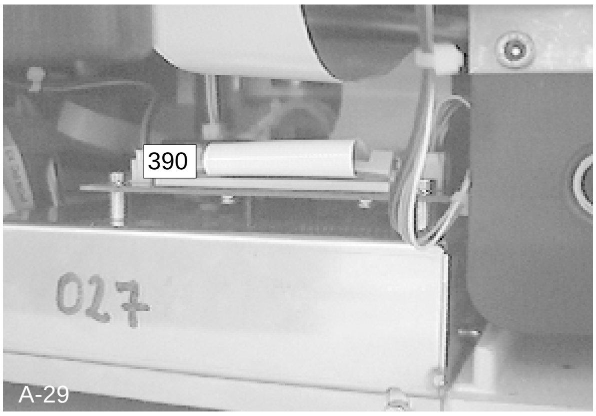
The Keyboard Assy consists of the following components:

- Keyboard Assy (User Interface), which consists of a foil-protected keyboard with an integrated LCD.
- Keyboard Housing
- STAT Holder, see 4.2.3

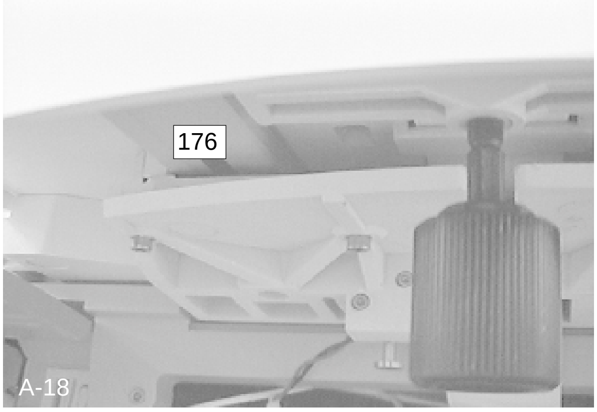
4.2.2.2 Location







71	Photo Coupler Keyboard
72	Magnet Keyboard
128	Keyboard Assy
173	STAT Holder
174	Keyboard Housing
175	Keyboard Mounting Plate



176	Bearing Keyboard
177	Knurled Knob
178	Screw
179	Connecting Cable
374	Water Drip Tray
390	Strain Relief
414	Keyboard Slider
514	Cable FL1

4.2.2.3 Functional Description

All data input and output takes place via the keyboard assy.
In addition, a connection for an external keyboard is provided on the lower part of the keyboard assy.

The vertical angle of the keyboard assy can be adjusted by means of the Knurled Knob (177). Moreover, the Bearing Keyboard (176) allows for horizontal repositioning of the keyboard assy backwards and forwards.

Two holders for STAT samples are provided at the rear of the keyboard assy. The STAT holder may be pulled out to the front if STAT samples are to be inserted during a run. Elecsys 1010 is able to detect the actual status of the STAT holder (whether in loading or operating position). An integrated magnet prevents that the STAT holder is pulled out while the system attempts to access one of the positions. The magnet is accessible through a hole in the lower part of the housing so that it can be activated manually if main power fails.

4.2.2.4 Tubings

NA

4.2.2.5 Service Procedures

Replaceable Components:

- Photo Coupler Keyboard (71)
- Magnet Keyboard (72)
- Keyboard Assy (128)
- Keyboard Housing (174)
- Keyboard Mounting Plate (175)
- Bearing Keyboard (176)

- Keyboard Slider (414)
- Cable FL1 (514)

Dismounting the Keyboard Assy:

- Remove the STAT Holder (173).
- Dismount the Water Drip Tray (374).
- Loosen the screws (178).
- Slightly pull the Keyboard Assy out to the front.
- Disconnect the cables of the Photo Coupler Keyboard (71) from the PCB.
- Disconnect the cable of the Magnet Keyboard (72) from the PCB.
- Unscrew the Strain Relief (390).
- Connecting Cables of the PC and the PCB from the PCB.
- Remove the Keyboard Assy.
- ***NOTE: When reconnecting the cables to the Keyboard Assy (128), the blue ends of the cables should point downward.***
  First cable is ground.
  Second cable is voltage supply and data line.
- ***NOTE: When remounting the keyboard assy, the STAT position will have to be readjusted, see Chapter 6 Software.***

Dismounting the Keyboard Assy

The keyboard assy may only be replaced as a complete assembly.

4.2.2.6 Wiring

4 connecting cables, 2 for the keyboard assy, 1 for keyboard photo coupler, 1 for the keyboard magnet.
For further information, please refer to Chapter
5 Electronics.

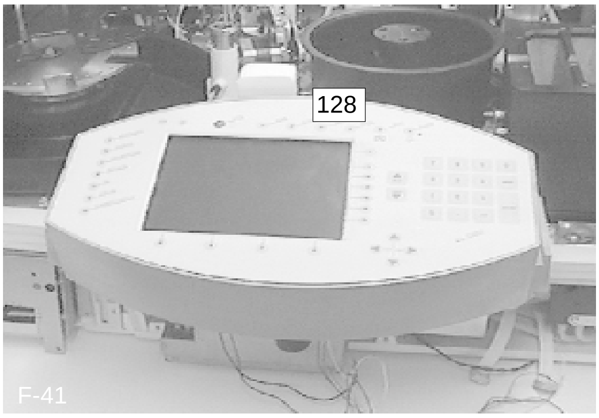
4.2.2.7 Additional Notes

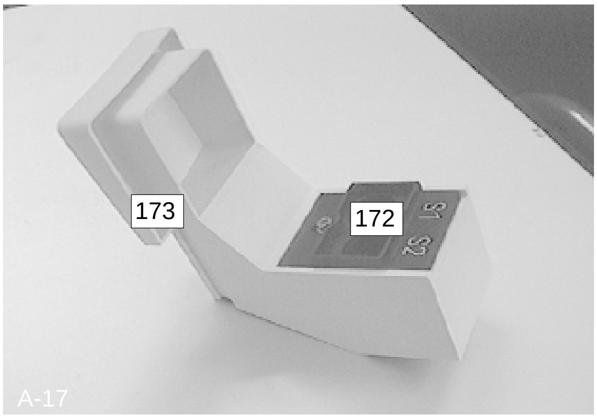
4.2.3 STAT Holder

4.2.3.1 General Description

Elecsys 1010 incorporates a STAT holder, which allows for insertion of two emergency samples.

4.2.3.2 Location





128 Keyboard Assy
172 Tube Holder STAT
173 STAT Holder

4.2.3.3 Functional Description

The user may load the emergency samples in the STAT holder during a run. The current batch will be interrupted and the STAT sample is pipetted as soon as posible. No data will be lost.

4.2.3.4 Tubings

NA

4.2.3.5 Service Procedures

Replaceable Components:

- Tube Holder STAT (172)
- STAT Holder (173)

Dismounting the STAT Holder:

To replace the STAT holder, push the Keyboard Assy (128) to the front and remove the STAT holder by pulling it upward. The STAT holder may be cleaned in a dishwasher.
NOTE: When mounting a new STAT holder, it will have to be readjusted, see Chapter 6 Software.

4.2.3.6 Wiring

NA

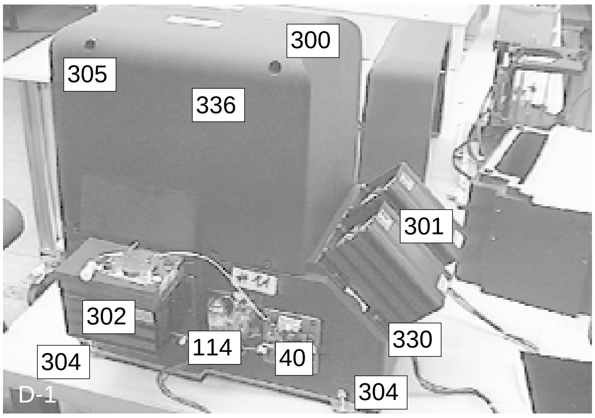
4.2.3.7 Additional Notes

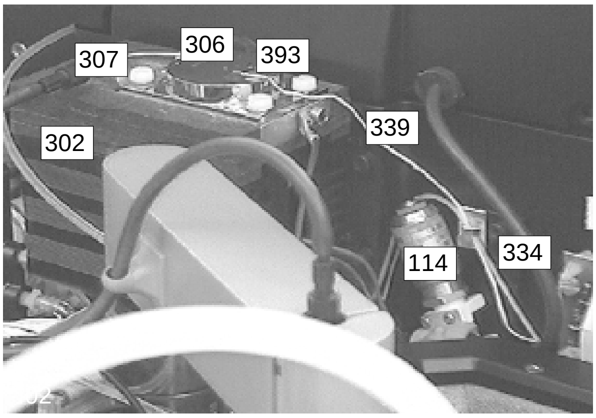
4.2.4 Detection Module

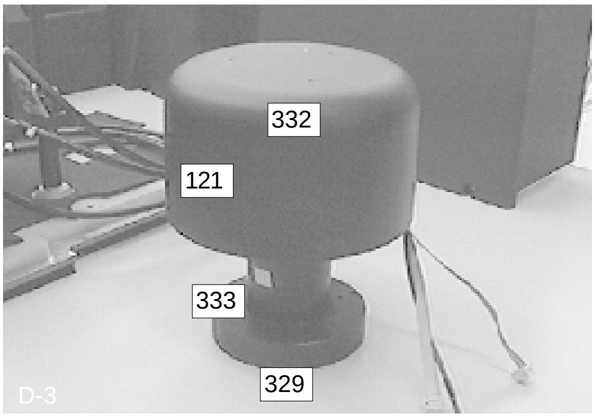
4.2.4.1 General Description

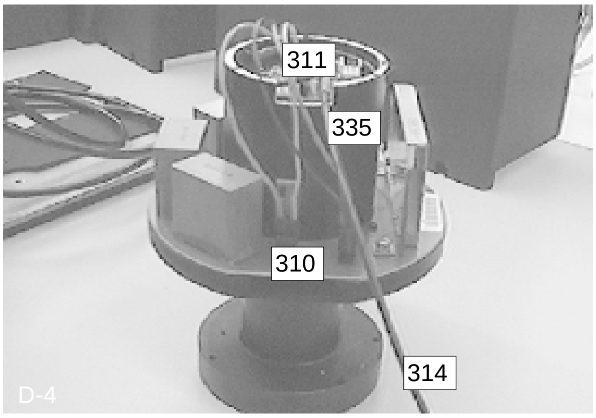
The detection module accommodates the ECL cell. The photomultiplier tube (PMT), electromagnetically protected by a special housing, as well as the holder for the preamplifier and high voltage module are located above the cell. The magnet with the drive for the bead capturing is located below the cell. A motor/spindle unit moves the magnet vertically towards the bottom of the cell from below. The components are located in a housing. The housing constitutes an optical, electrical and thermal protection for the detection process. The optimal temperature for the process of the ORIGEN® technology is 28°C. Therefore, the detection module is heated to 28°C.

4.2.4.2 Location

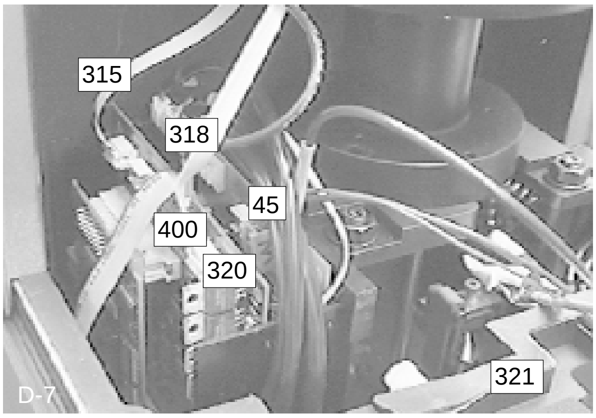


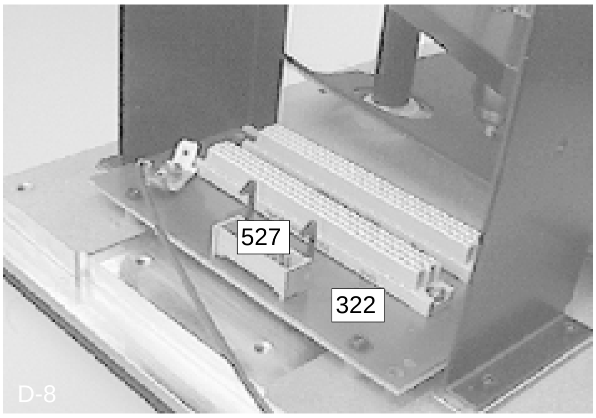


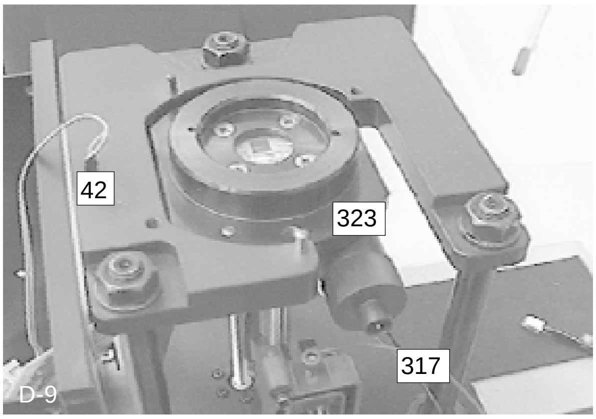


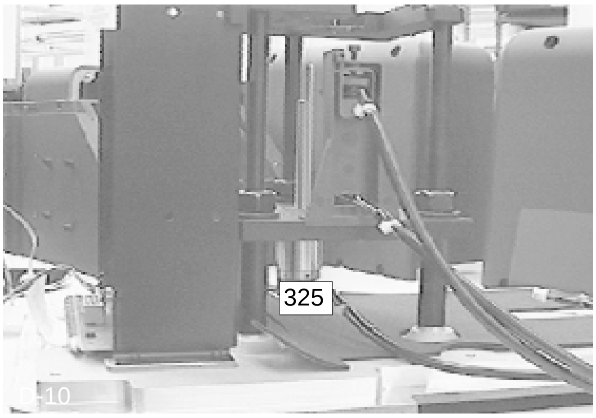


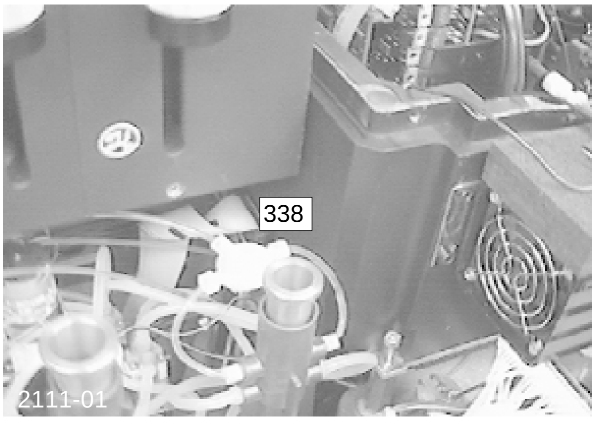
40	PCB Preamp Temp
114	Magnet Valve Assy VM1
121	Photomultiplier
300	Detection Module
301	Peltier Assy Detection Module
302	Peltier Assy Preheater
304	Screw
305	Screw
306	Preheater Sipper
307	Screw
310	PCB Preamp High Voltage
311	Detection Preamplifier
314	Cable M1/M4
329	Screw-cap
330	Screw
332	Cover
333	Screw
334	Screw
335	Bush
336	Hood
339	Screw
393	Sensor

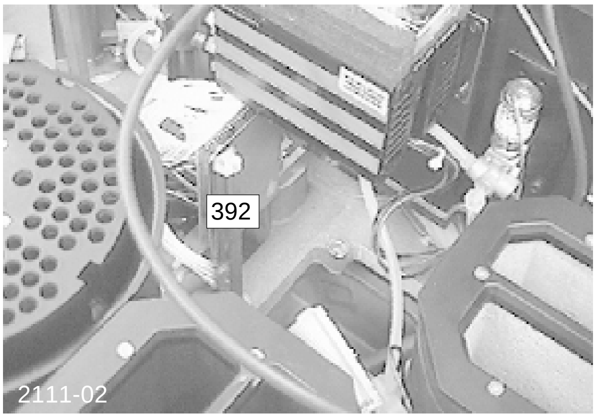

315
318
45
400
320
321
D-7




42
323
317
D-9

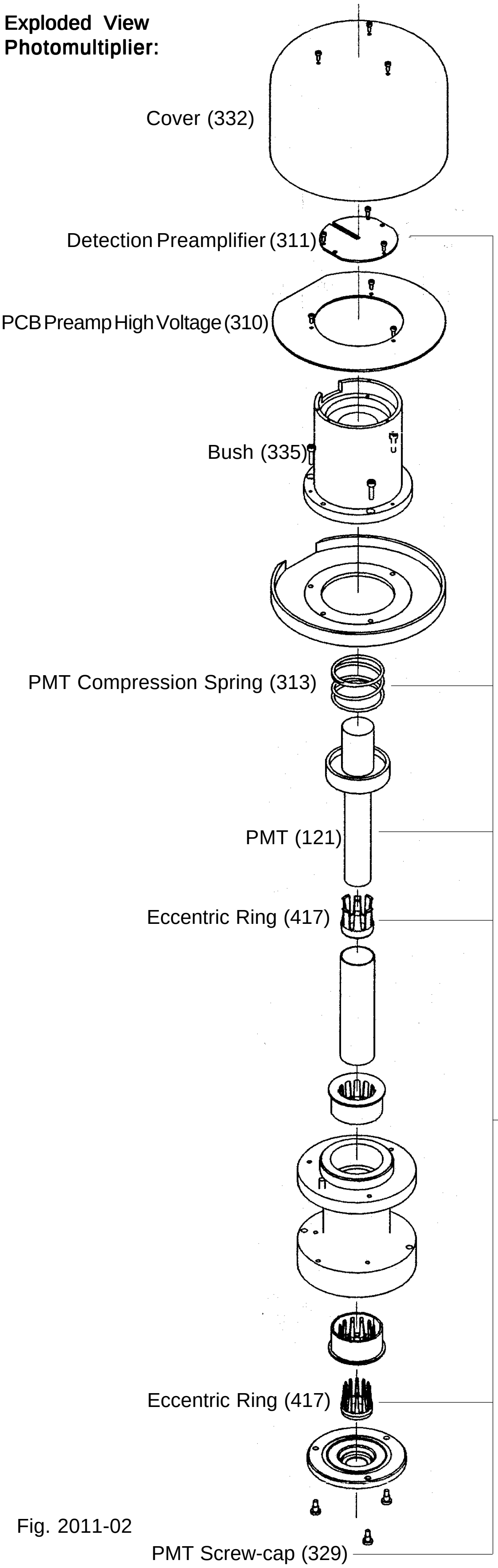






42	Sensor
45	PCB Preamp Temperature
315	Cable M2
317	Cable M5
318	PCB Potentiostat/Motor
320	PCB Detection Module B1
321	Seal Ring
322	PCB Dist Detection Module
323	Cell and Reference Electrode
325	Motor Magnet Drive
338	Cable M9
392	Bolt
400	PCB Controller, located on PCB B1
527	Cable M10

Exploded View Photomultiplier:


Cover (332)
Detection Preamplifier (311)
PCB Preamp High Voltage (310)
Bush (335)
PMT Compression Spring (313)
PMT (121)
Eccentric Ring (417)
Eccentric Ring (417)
PMT Screw-cap (329)

Photomultiplier (312) consisting of:

- PMT (121)
- Detection Preamplifier (311)
- PMT Compression Spring (313)
- Screw-cap (329), not depicted
- Eccentric Ring (417)

Fig. 2011-02

Cross Section: Detection Cell

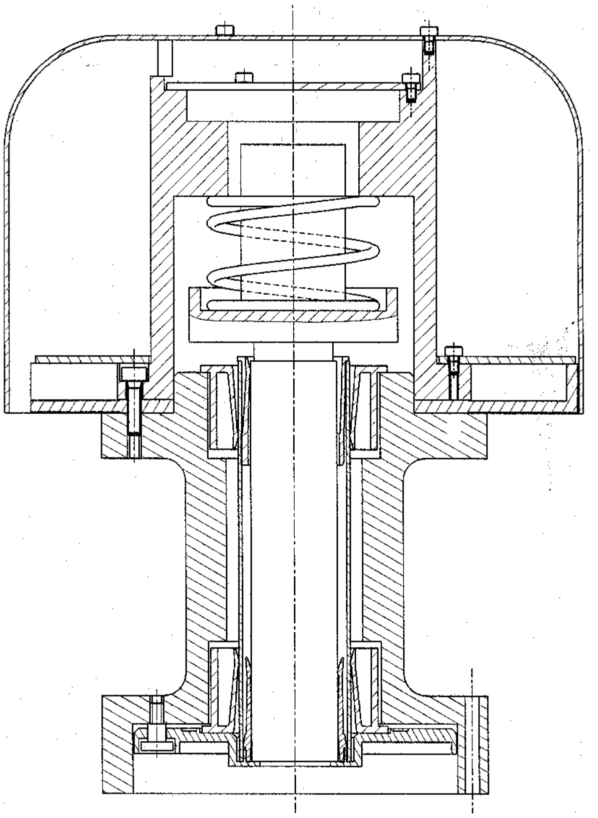


Fig. 2011-04

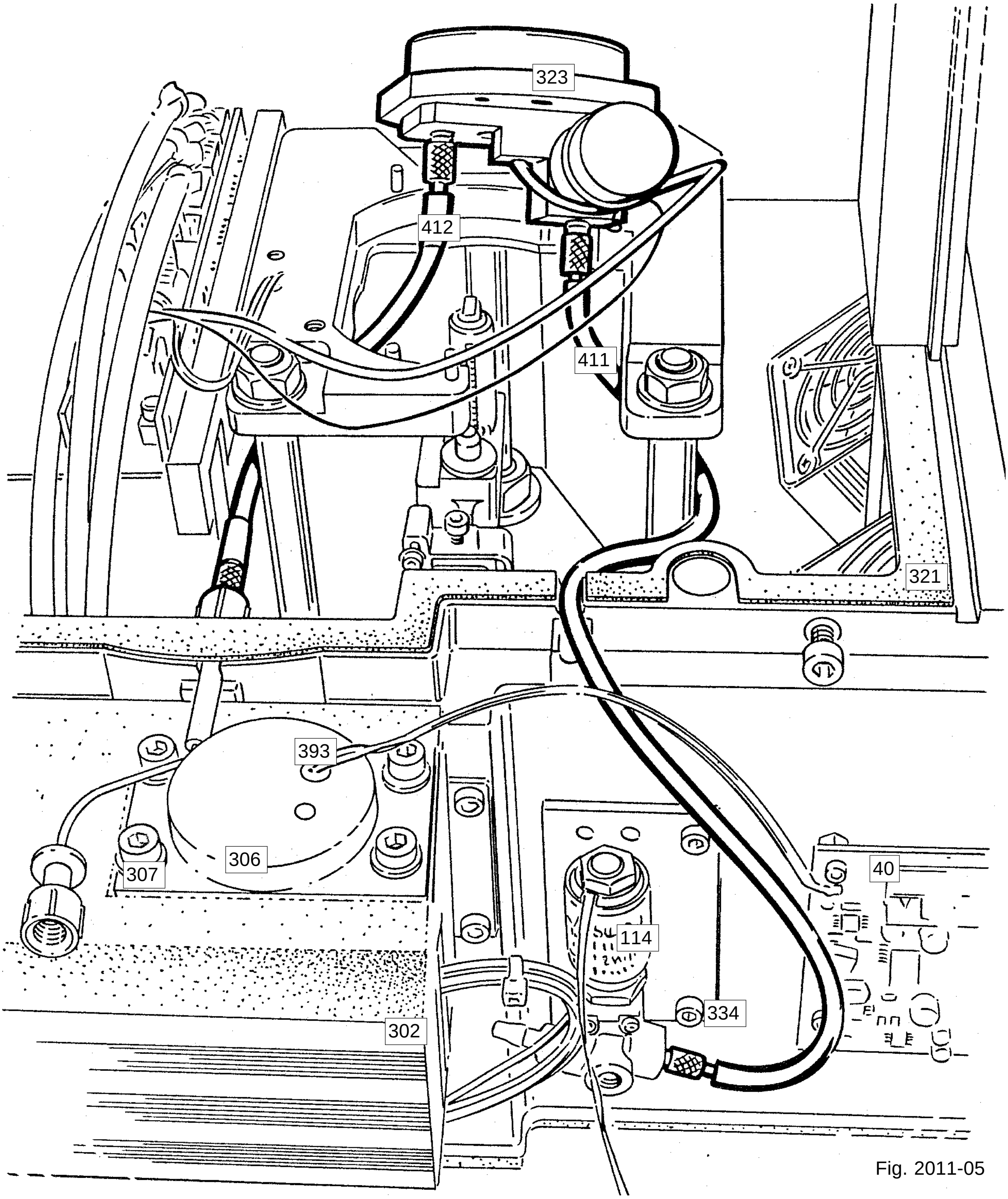

323
412
411
321
393
306
307
40
114
334
302

Fig. 2011-05

40	PCB Preamp Temperature
114	Magnet Valve Assy VAD2/VM1
302	Peltier Assy Preheater
306	Preheater Sipper
307	Screw
321	Seal Ring
323	Cell and Reference Electrode
334	Screw
393	Sensor
411	Tubing Cell 0.8
412	Tubing Sipper (2) 0.8

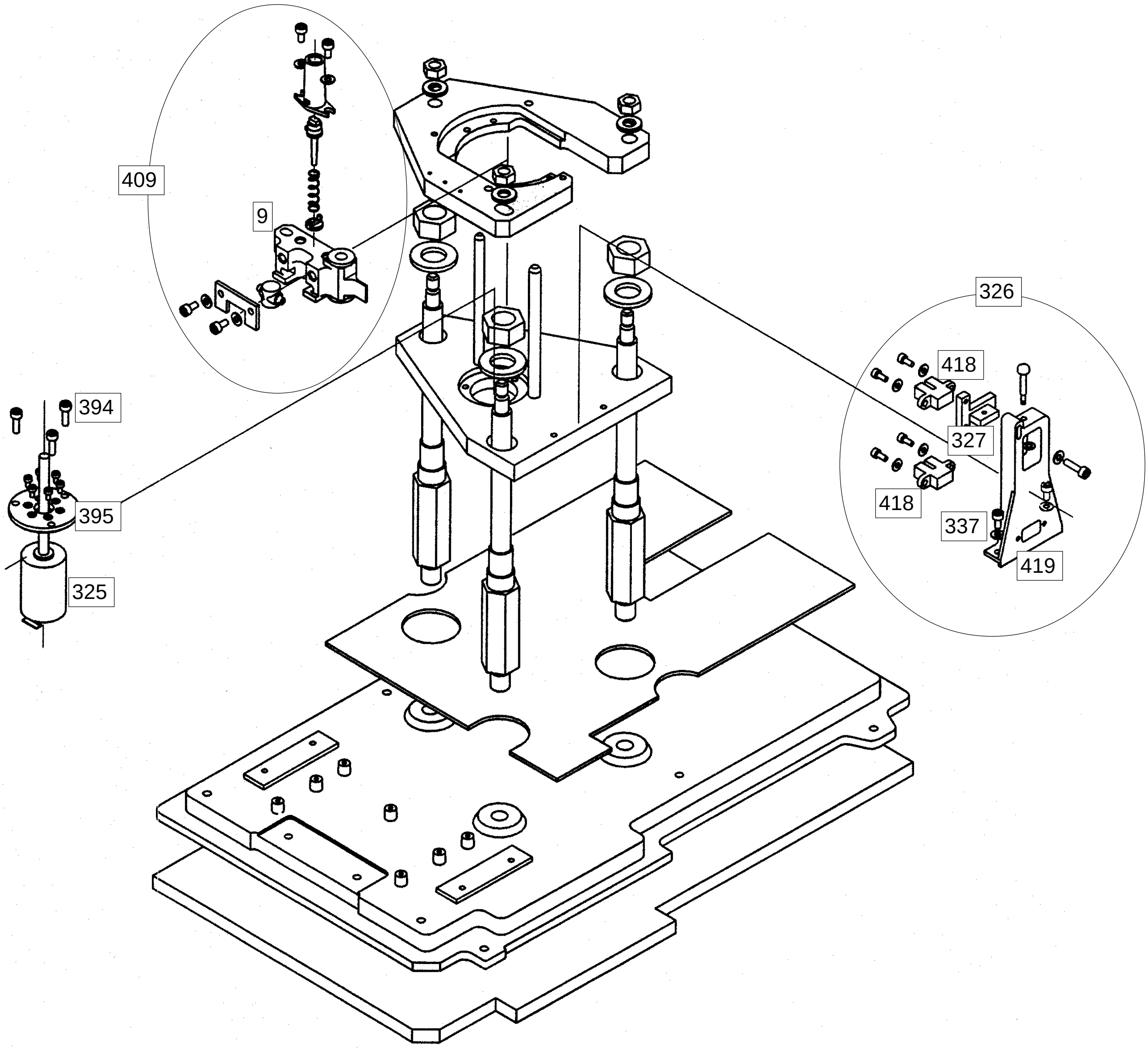


Fig. 2011-01

325 Motor Magnet Drive
326 Holder Photo Coupler MD1, preassembled, consisting of:
  - Photo Coupler Holder (327)
  - Photo Coupler Assy, preadjusted (418)
  - Photo Coupler Holder (419)
337 Screw
394 Screw
395 Motor Mounting
409 Holder Magnet Assy consisting of:
  - Magnet Holder Assy (9)
  - XY Adjusting Tool for Magnet (37), not depicted

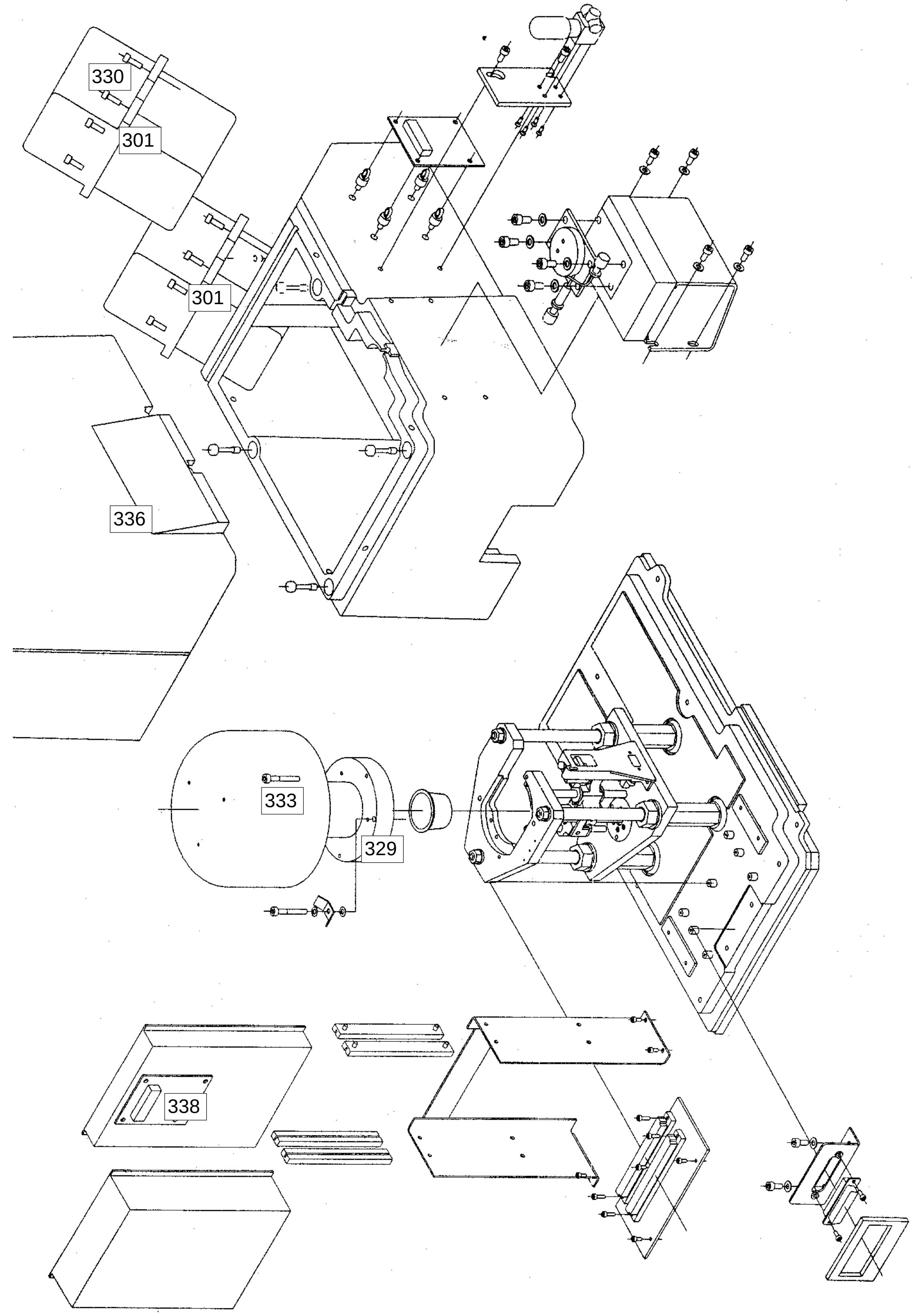

330
301
301
336
333
329
338

Fig. 2011-03

301 Peltier Assy Detection Module	333 Screw
329 Screw-cap	336 Hood
330 Screw	338 Cable M9

4.2.4.3 Functional Description

The detection module incorporates the detection cell. The photomultiplier with its magnetically protected housing and the holder for the preamplifier and high voltage module are located above the cell. The magnet with the drive for the bead capturing magnet is located below the cell. The housing constitutes an optical, electrical and thermal protection for the detection process.

4.2.4.4 Tubings

Below please find the number of tubing connections of the individual components. For information in more detail, please refer to Chapter 3 Fluidics.

Detection Module (300), two tubing connections

1.	Cell	to	Magnet Valve Assy VAD2/VM1
2.	Cell	to	Peltier Assy Preheater

Preheater Sipper (306), two tubing connections

1.	Sipper Needle	to	Preheater
2.	Preheater	to	Cell

Magnet Valve Assy VAD2/VAB1 (114), three connections

1.	Magnet Valve Assy	to	Waste/Water Distributor
2.	Magnet Valve Assy	to	Dilutor Valve VSD
3.	Cell	to	Magnet Valve Assy

4.2.4.5 Service Procedures

Replaceable Components:

- Magnet Valve Assy VAD2/VAB1 (114)
- Peltier Assy Detection Module (301)
- Peltier Assy Preheater (302)
- Preheater Sipper (306)
- PCB Preamp High Voltage (310)

- Photomultiplier (312), consisting of:
  - Detection Preamplifier (311)
  - PMT Compression Spring (313)
  - PMT (121)
  - Eccentric Ring (417)
  - Screw-cap (329)

- PCB Potentiostat/Motor (318)
- PCB Preamp Temperature (40)
- PCB Preamp Temperature (45)
- PCB Detection Module B1 (320)
- PCB Dist Detection Module (322)
- Motor Magnet Drive (325)

- Holder Photo Coupler MD1 (326), consisting of:
  - Photo Coupler Holder (419)
  - Photo Coupler Holder (327)
  - Photo Coupler Assy, preadjusted (418)

- Cable M1/M4 (314), included in Set 1, see Chapter 8
- Cable M2 (315), included in Set 1, see Chapter 8
- Cable M5 (317), included in Set 1, see Chapter 8
- Cable M10 (527), included in Set 1, see Chapter 8

- Holder Magnet Assy (409) consisting of:
  - Magnet Holder Assy (9)
  - XY Adjusting Tool for Magnet (37), not depicted

- Cable M9 (338)
- PCB Controller (400), located on B1
- Tubing Cell 0.8 (411)
- Tubing Sipper (2) 0.8 (412)

Dismounting the Detection Module:

Preparatory Work:

- Dismount the Bottle Temperature Assy at the rear, see 4.2.21.
- Dismount the Sipper MFA, see 4.2.6.
- Dismount the Incubator Drive, see 4.2.19.
- Pull off the tubings from WD2 (on the right side only), see 4.2.16.

Servicing the Detection Module:

- Unscrew the Bolt (392).
- Dismount the Peltier Assy Preheater (302) with PCB Preamp Temperature (47), see below.
- Dismount the Magnet Valve Assy VAD2/VAB1 (114).
- Disconnect the Cable M9 (338).
- Disconnect the cable from the Peltier Assy Detection Module (301).
- Loosen the screws (304).
- Remove the Detection Module (300) to the front.

Dismounting the Peltier Assy Preheater:

- Remove the Hood (336).
- Undo the tubings.
- Disconnect the tubings from the PCB Preamp Temp (40) and Peltier Assy Preheater (302).
- Unscrew the PCB Preamp Temp (40).
- Remove the Peltier Assy Preheater (302).

Dismounting the Peltier Assy Detection Module:

Preparatory Work:

- Dismount the Detection Module, see above.

Servicing the Peltier Assy:

- Undo the tubings.
- Loosen the screws (330).
- Remove the Peltier Assy Detection Module (301).

Dismounting the PCB Preamp Temp Preheater Sipper:

The Sensor (393) is fixed with adhesive and cannot be removed. If the sensor is defective, the replacement part has to be fitted in the second hole and fixed with adhesive. Since there is only one more hole available for the sensor, the Preheater Sipper (306) will also have to be replaced if the sensor has to be replaced again. Always replace the sensor together with the PCB Preamp Temperature (40), as the trimming values are stored on the PCB.
For the adhesive for the temperature sensor, please refer to Chapter 8. Hardening at room temperature will take approximately 15 hours. Therefore, fixing with adhesive tape is required.

Dismounting the Sipper Preheater:

- Remove the Hood (336).
- Disconnect the cables and tubings.
- Remove the PCB Preamp Temp (40).
- Loosen the screws (307).
- Remove the Preheater Sipper (306).

Dismounting the Magnet Valve Assy VAD2/VM1:

- Disconnect the cables and tubings.
- Loosen the screws (334).
- Remove the Magnet Valve Assy VAD2/VAB1 (114).

Dismounting the Detection Cell:

NOTE: Ensure that no light enters the PMT. Mount the screw-cap (329) immediately after dismounting.

- Disconnect the cables and tubings.
- Loosen the screws (333).
- Remove the Detection Cell (309).

Dismounting the PCB Preamp High Voltage:

NOTE: Disconnect the main plug prior to servicing high voltage components.

- Remove the Cover (332).
- Disconnect the cables from the PCB Preamp High Voltage (310).
- Remove the PCB Preamp High Voltage (310).

Dismounting the Detection Preamplifier:

- Remove the Cover (332).
- Disconnect the cables from the Detection Preamplifier (311).
- Remove the Detection Preamplifier (311).

Dismounting the Photomultiplier:

- Please refer to the exploded view of the photomultiplier.
- Remove the Cover (332).
- Disconnect the cables from the Detection Preamplifier (311) and PCB Preamp High Voltage (310).
- Remove the Detection Preamplifier (311).
- Remove the PCB Preamp High Voltage (310).
- Remove the Bush (335).
- Disconnect the cable from the PMT (121).
- Remove the PMT (121).

Dismounting the PMT Compression Spring:

- Please refer to the exploded view of the photomultiplier.
- Remove the Cover (332).
- Disconnect the cables.
- Remove the Detection Preamplifier (311).
- Remove the PCB Preamp High Voltage (310).
- Remove the Bush (335).
- Remove the PMT Compression Spring (313).

Dismounting the PCB Potentiostat/Motor and PCB Preamp Temperature:

The PCB Preamp Temperature (45) is located on the PCB Potentiostat/Motor (318).
The Sensor (42) is fixed with adhesive and cannot be removed. If the sensor is defective, the replacement part has to be fitted in the second or third hole and fixed with adhesive. For the adhesive for the temperature sensor, please refer to Chapter 8 Spare Parts.
New holes have to be drilled if required. Always replace the sensor together with the PCB Preamp Temperature (45), as the trimming values are stored on the PCB.
Hardening at room temperature will take approximately 15 hours. Therefore, fixing with adhesive tape is required.

- Disconnect the cables.
- Dismount the PCB Potentiostat/Motor (318).
- Remove the PCB Preamp Temperature (45) from the PCB Potentiostat/Motor (318).

Dismounting the PCB Detection Module B1:

- Disconnect the cables.
- Remove the PCB Detection Module B1 (320) upwards.

Dismounting the Seal Ring:

- Loosen the screws (305).
- Remove the Hood (336).
- Remove the Seal Ring (321).

Dismounting the PCB Dist Detection Module:

- Disconnect the cables.
- Dismount the PCB Potentiostat/Motor (318).
- Dismount the PCB Detection Module B1 (320).
- Remove the PCB Dist Detection Module (322).

Dismounting the Stepping Motor Assy:

- Remove the Hood (336).
- Loosen Screw (394).
- Undo the cable connection of Motor Magnet Drive (325).
- Remove the Motor Magnet Drive (325) with the Motor Mounting (395).

Dismounting the Holder Photo Coupler MD1:

- Remove the Hood (336).
- Loosen the screws (337).
- Dismount the Holder Photo Coupler MD1 (326).

NOTE: The photo coupler holder MD1 is preadjusted at the factory and may only be replaced as a whole assembly.

4.2.4.6 Wiring

Below please find the number of cable connections of the individual components. For information in more detail, please refer to Chapter 5 Electronics.

PCB Preamp High Voltage (310)

Detection Preamplifier (311)

PMT (121)

Cable M1/M4 (314)

Cable M2 (315)

Cable M5 (317)

Cable M9 (338)

Cable M10 (527)

Holder Photo Coupler MD1 (326)

Motor Magnet Drive (325)

PCB Detection Module B1 (320)

PCB Potentiostat/Motor (318)

PCB Dist Detection Module (322)

PCB Preamp Temperature (40)

Peltier Assy Detection Module (301)

Peltier Assy Preheater (302)

Magnet Valve Assy VAD2/VAB1 (114)

Cell and Reference Electrode (323)

PCB Preamp Temp (45)

4.2.4.7 Additional Notes

4.2.5 Cell and Reference Electrode

4.2.5.1 General Description

Elecsys 1010 incorporates a cell and reference electrode that conducts the detection of the samples.

ECL Measuring Cell

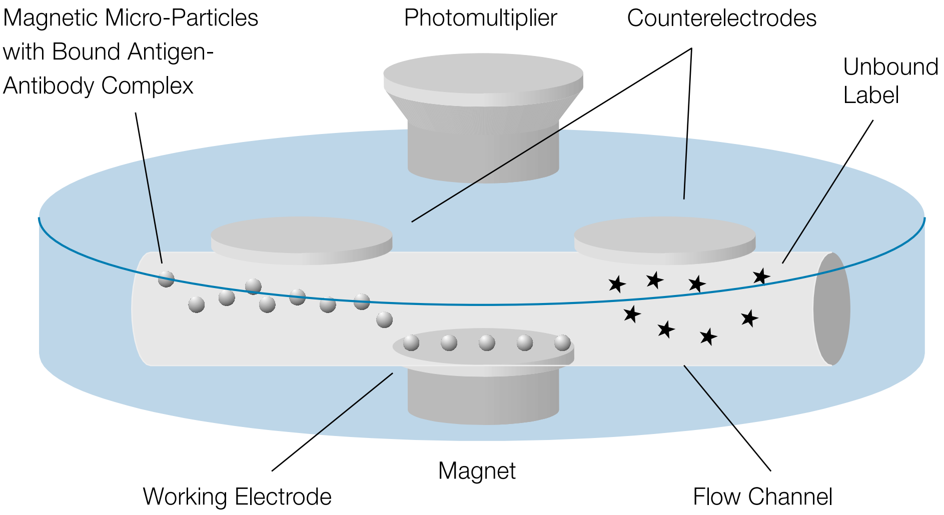
The core of the system is the ECL measuring cell which is designed as a flow-through cell. Essentially, three operating steps are performed in the measuring cell.

Bound/Free Separation

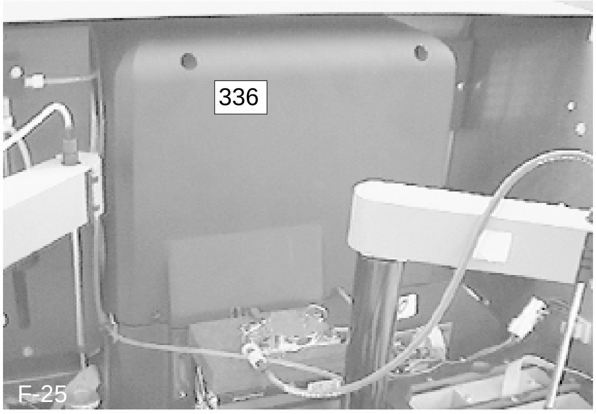
Using a magnet, the streptavidin microparticles, that are coated with antigen-antibody complexes, are uniformly deposited on the working electrode. The magnet is located below the working electrode. A system buffer (ProCell) is used to wash the particles on the working electrode and to flush out the excess reagent and sample materials from the measuring cell.

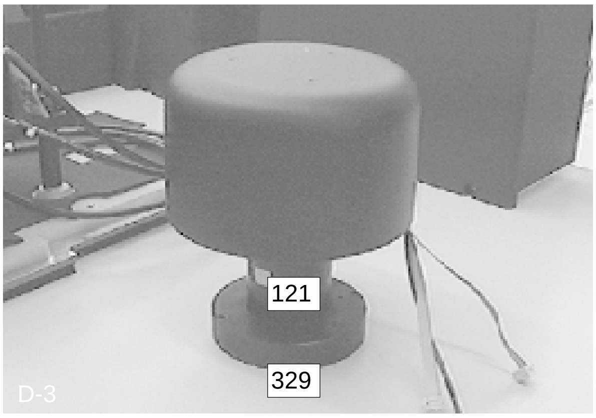
ECL Reaction

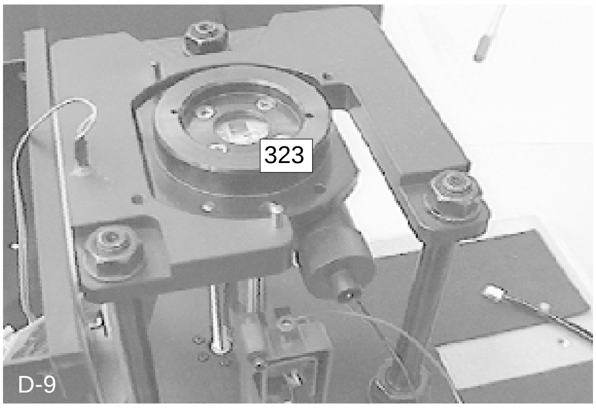
A voltage is then applied to the electrode on which the microparticles, coated with antigen-antibody complexes, are deposited to initiate the ECL reaction. The light emission is measured with a photomultiplier. The system then uses the corresponding signals for the calculation of results.
Release of Microparticles and Cell Cleaning
Once the measurement is completed, the magnetic microparticles are washed away from the electrode surface with a special cleaning solution (CleanCell). The surface of the measuring cell is regenerated by varying the potential on the electrode. The cell is then ready for another measurement.



4.2.5.2 Location







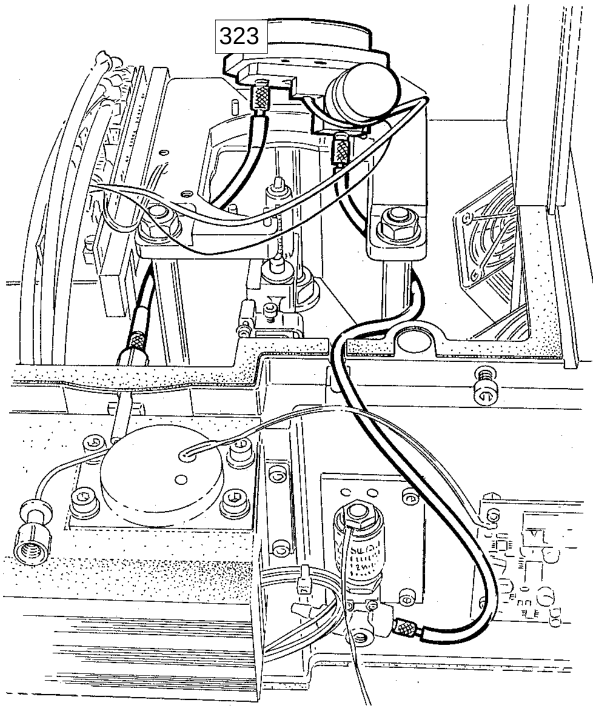
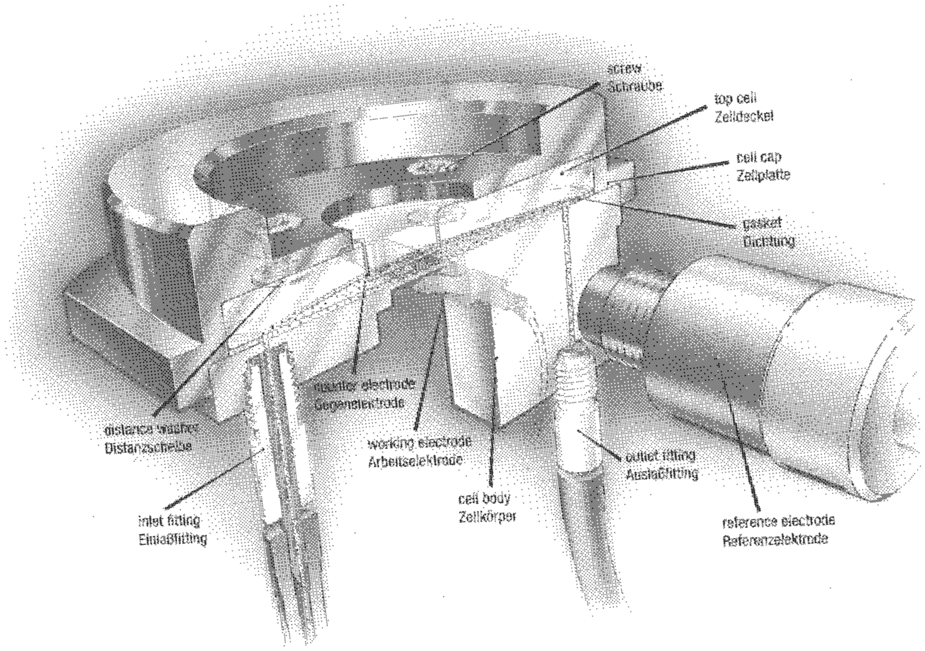
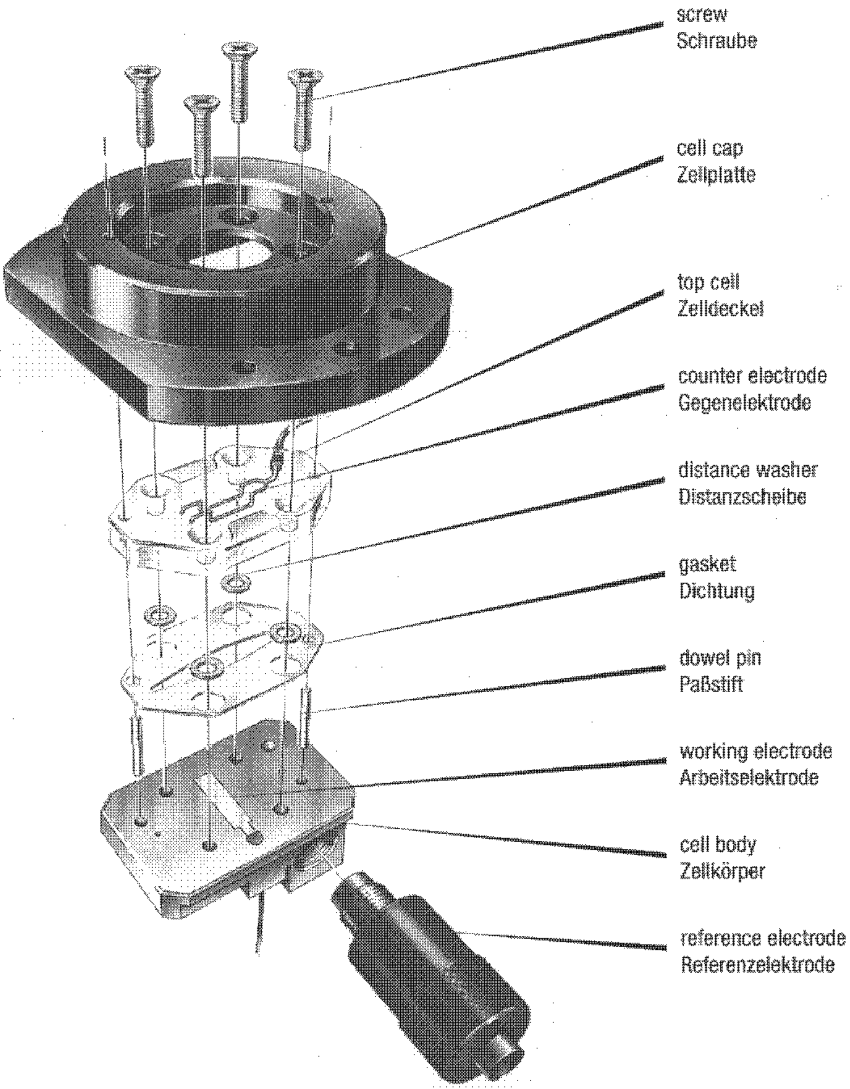


Fig. 2011-05

121	PMT
323	Cell and Reference Electrode
329	Screw-cap
336	Hood


screw
Schraube
top cell
Zelldeckel
cell cap
Zellplatte
gasket
Dichtung
counter electrode
Gegenelektrode
distance washer
Distanzscheibe
working electrode
Arbeitselektrode
inlet fitting
Einlaßfitting
cell body
Zellkörper
outlet fitting
Auslaßfitting
reference electrode
Referenzelektrode


screw
Schraube
cell cap
Zellplatte
top cell
Zelldeckel
counter electrode
Gegenelektrode
distance washer
Distanzscheibe
gasket
Dichtung
dowel pin
Paßstift
working electrode
Arbeitselektrode
cell body
Zellkörper
reference electrode
Referenzelektrode

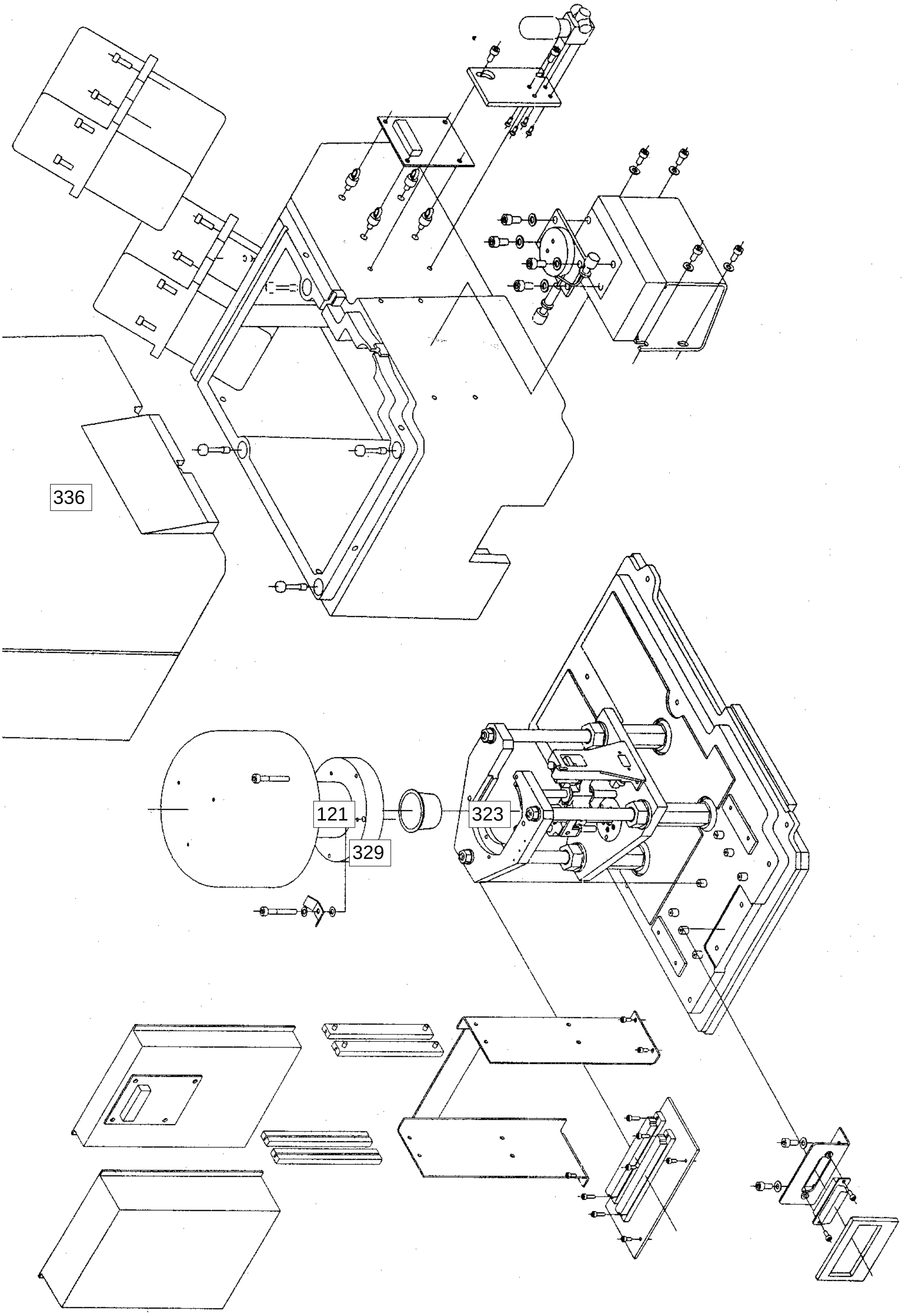


Fig. 2011-03

121	PMT
323	Cell and Reference Electrode
329	Screw-cap
336	Hood

4.2.5.3 Functional Description

The cell has three electrodes: The working electrode (where the beads are captured), the counte relectrode and the reference electrode. A constant voltage is applied between the working electrode and the counterelectrode to conduct the detection process. For cleaning and conditioning of the cell a voltage is applied.

4.2.5.4 Tubings

The cell and reference electrode has two tubing connections. For further information, please refer to Chapter 3 Fluidics.

4.2.5.5 Service Procedures

Conditions for measuring cell storage and transportation:

The conditions for measuring cell storage and transportation are as follows:

1. Shipping and transport:

-10°C to 40°C	for maximum of 1 week
-20°C to 50°C	for maximum of 24 hours

2. Shelf life:

7°C to 30°C	1 year
cons. 8°C	approx. 1½ years

The MCs in Mannheim will be stored in a fridge at 8°C.

Replaceable Components:

- Cell and Reference Electrode (323)

Cell Exchange

The cell and reference electrode need to be exchanged at the same time. The exchange interval is normally after 1 year or 100,000 tests. This period is monitored by the counter in the maintenance log of the operation software.

Prior to the disassembly, the cell need to be decontaminated. This is carried out with the service software by starting the Cell Exchange procedure. With this Clean cell is taken into the cell and need to remain inside for a minimum of 20 minutes. During this period routine maintenance work can be performed. After the decontamination procedure, part 2 of the cell exchange procedure can be started consisting of first priming the cell with Pro Cell followed by air. Then the cell may be removed from the instrument.

Remove the cell following the instructions in the order given below:

Fore more information refer to chapter 2.5.6

Dismounting the Detection Cell including the Reference Electrode:

NOTE: Ensure that no light enters the PMT. Mount the screw-cap (329) immediately after dismounting.
NOTE: The cables of the reference electrode (323) should be fastened with tie-wraps to prevent that they get into the action sphere of the magnet.

- Open the Hood (336).
- Disconnect all cables from the Detection Cell (309).
- Dismount the Detection Cell (309).
- Disconnect all cables and tubings from the Cell and Reference Electrode (323).
- Remove the Cell and Reference Electrode (323) by pulling it upward.

4.2.5.6 Wiring

The cell and reference electrode is provided with a cable connection. For further information, please refer to Chapter 5 Electronics.

4.2.5.7 Additional Notes

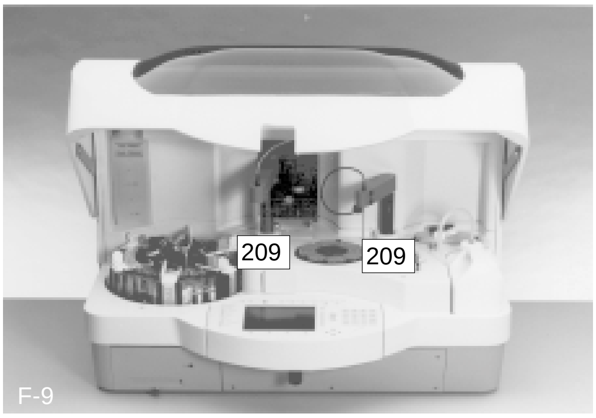
✎

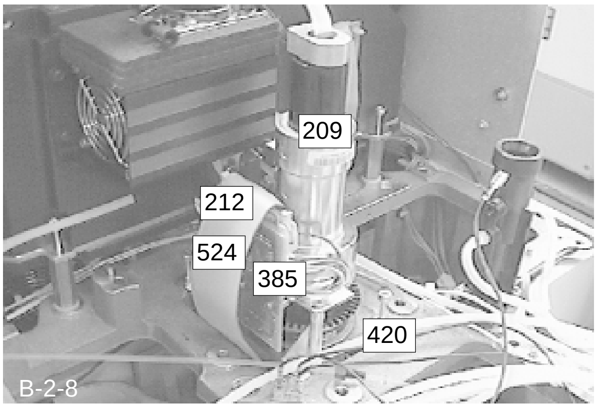
4.2.6 Multi Functional Arm (MFA)

4.2.6.1 General Description

Elecsys 1010 incorporates two multi functional arms: one transfers samples/reagents from the sample/reagent rotor to the incubation rotor, while the other takes in incubate or assay buffer and cell cleaner for transfer to the detection cell. Both MFAs are identical and may be exchanged one for another.

4.2.6.2 Location





209	MFA Assy
212	Cable D61
383	Stepping Motor PX 244 (MFA)
384	Stepping Motor PK 244 (MFA)

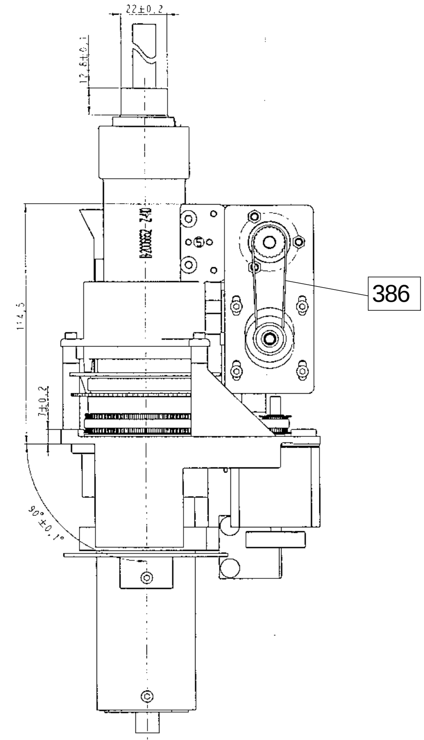


Fig. ink-1

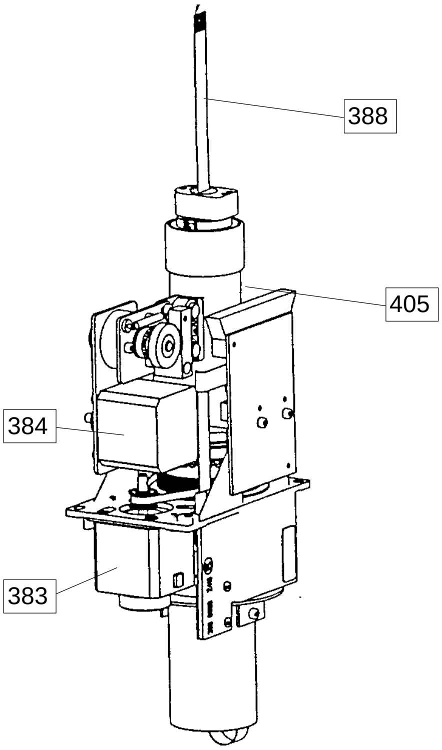


Fig. ink-2

385	PCB Dist MFA
386	Tooth Belt (MFA)
388	Cable (MFA)
405	Hall Sensor MFA
420	Screws
524	Cable S51

4.2.6.3 Functional Description

The vertical and rotational movements are operated by separate stepping motors. The vertical movement is effected via a guide tube. The guide tube is raised/ lowered by a stepping motor via two pulleys and a tooth belt, or rotated by a second stepping motor and a tooth belt. The range of rotation can be ±170° from the mean position.

4.2.6.4 Tubings

NA

4.2.6.5 Service Procedures

Replaceable Components:

- MFA Assy (209)
- Cable D61 (212)
- Stepping Motor PX 244 (MFA) (383)
- Stepping Motor PK 244 (MFA) (384)
- PCB Dist MFA (385)
- Tooth Belt (MFA) (386)
- Cable (MFA) (388)
- Hall Sensor (MFA) (405)
- Cable S51 (524)

Dismounting the MFA Assy:

Preparatory Work:

- Remove the sipper arm (see Chapter 4.2.8) or S/R arm (see Chapter 4.2.7).
- Prior to dismounting the MFA incubator side, dismount the Peltier assy preheater, see Chapter 4.2.4.

Servicing the MFAs:

- Disconnect Cable D61 (212) or Cable S51 (524).
- Loosen the Screws (420).
- Remove the MFA Assy (209).
- ***NOTE: When remounting, the MFAs will have to be readjusted, please refer to Chapter 6 Software.***

4.2.6.6 Wiring

see Chapter 5 Electronics.

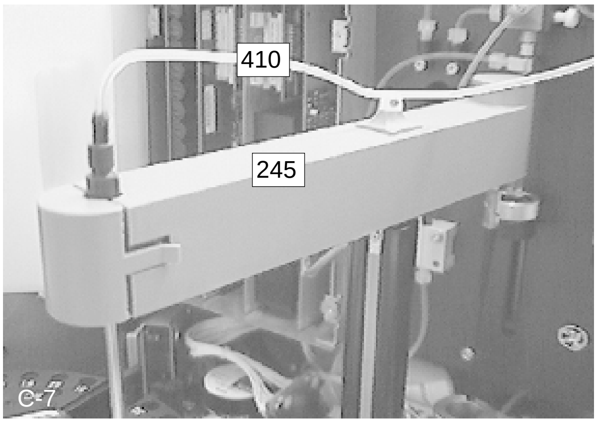
4.2.6.7 Additional Notes

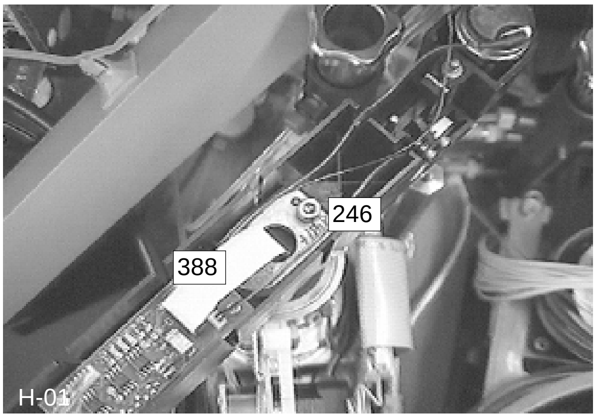
4.2.7 S/R Arm

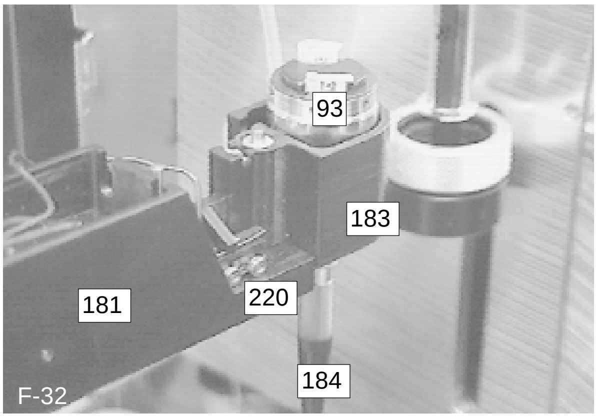
4.2.7.1 General Description

Elecsys 1010 has an S/R arm that constitutes the interface between the system and the reagents and samples.
It is easily accessible and easy to service. Defective parts can be replaced easily.

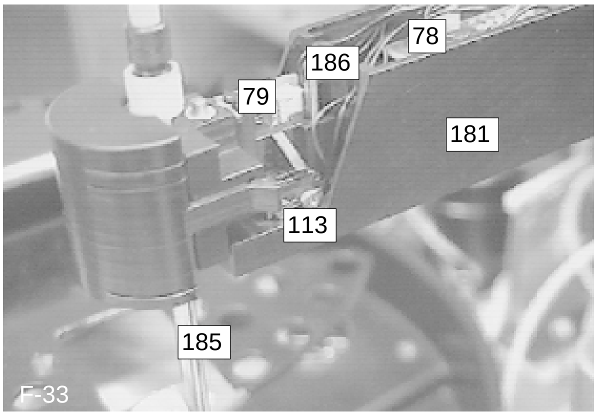
4.2.7.2 Location

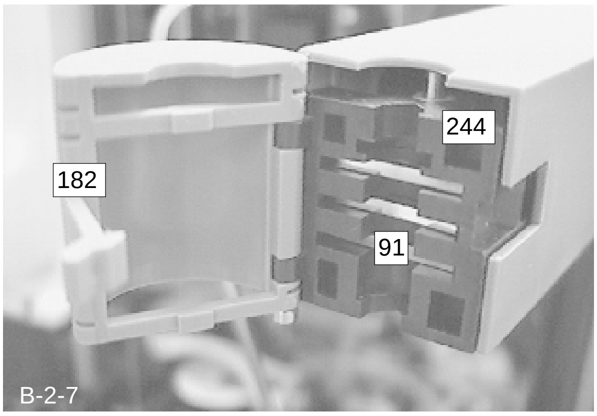


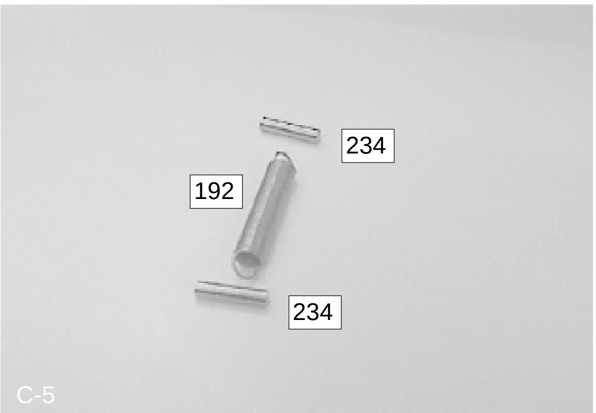



93
183
181
220
184
F-32

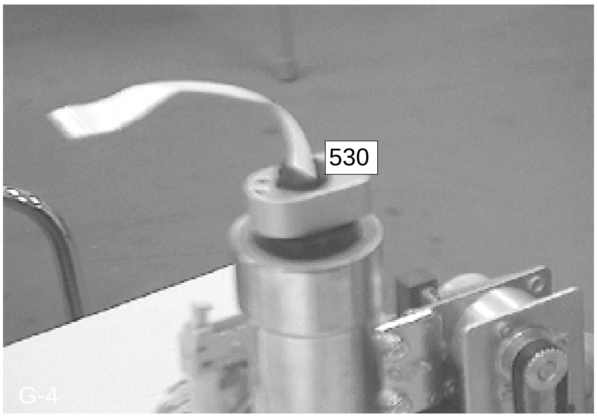
78	PCB LLD S/R
79	PCB Preamp LLD S/R
91	Contact Needle
93	Motor Assy Bead Mixer
113	Switch Sipper
181	Arm S/R
182	Holder Sipper Needle

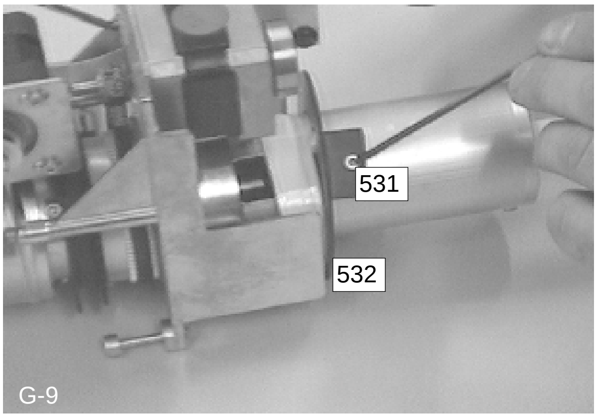

78
186
79
181
113
185
F-33

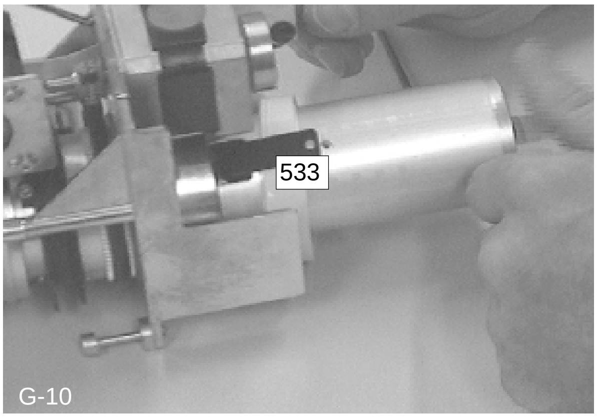

244
182
91
B-2-7

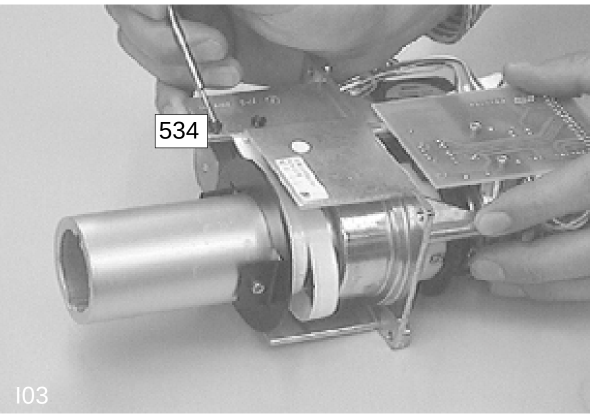

234
192
234
C-5

183	Holder Bead Mixer
184	Bead Mixer
185	Needle S/R
186	Cable Preamp Sipper
192	Spring
220	Switch Sipper
234	Spring Holder
244	Needle Holder
245	Cover S/R Arm
246	Screw
388	Cable MFA
410	Tubing S/R 1.5

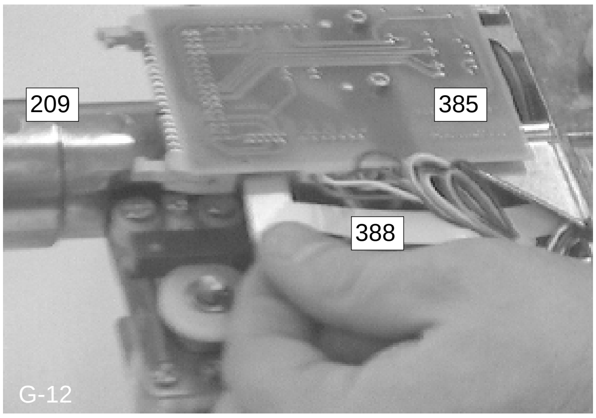


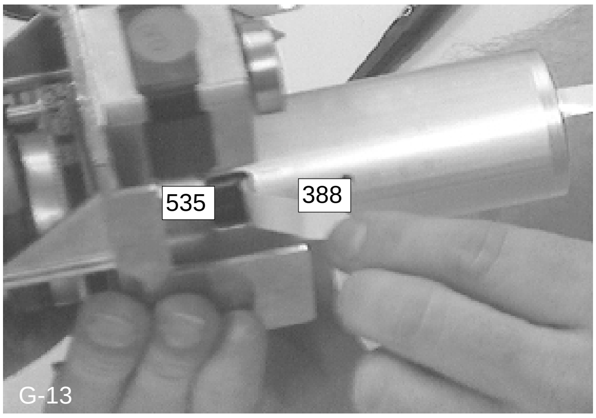


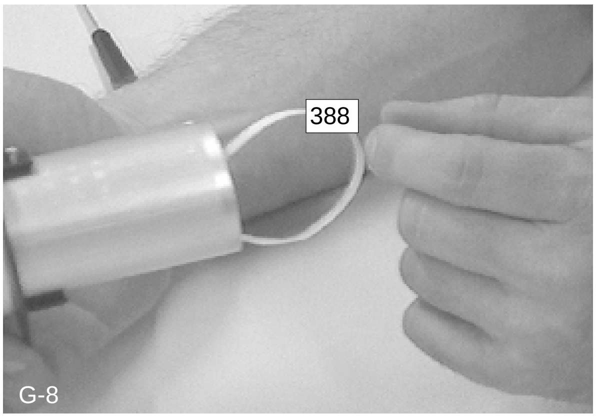




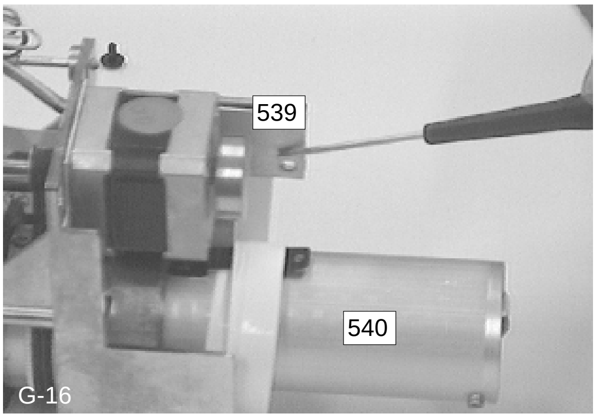
530	Rubber plug
531	Screw
532	Disk
533	Clamp

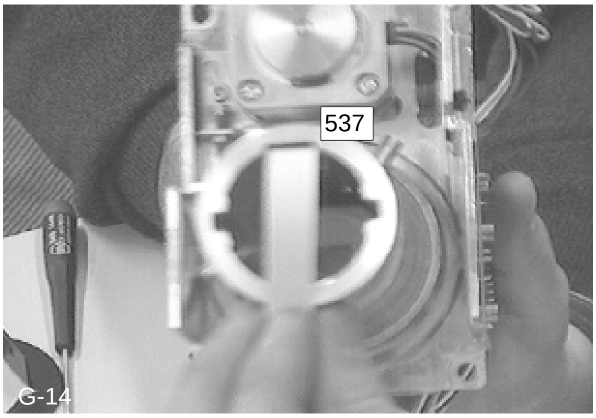

209
385
388
G-12

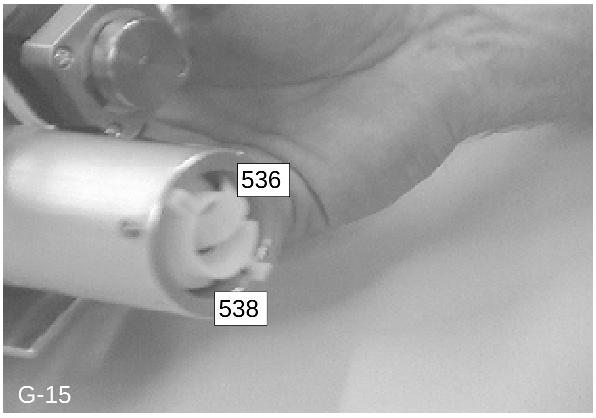




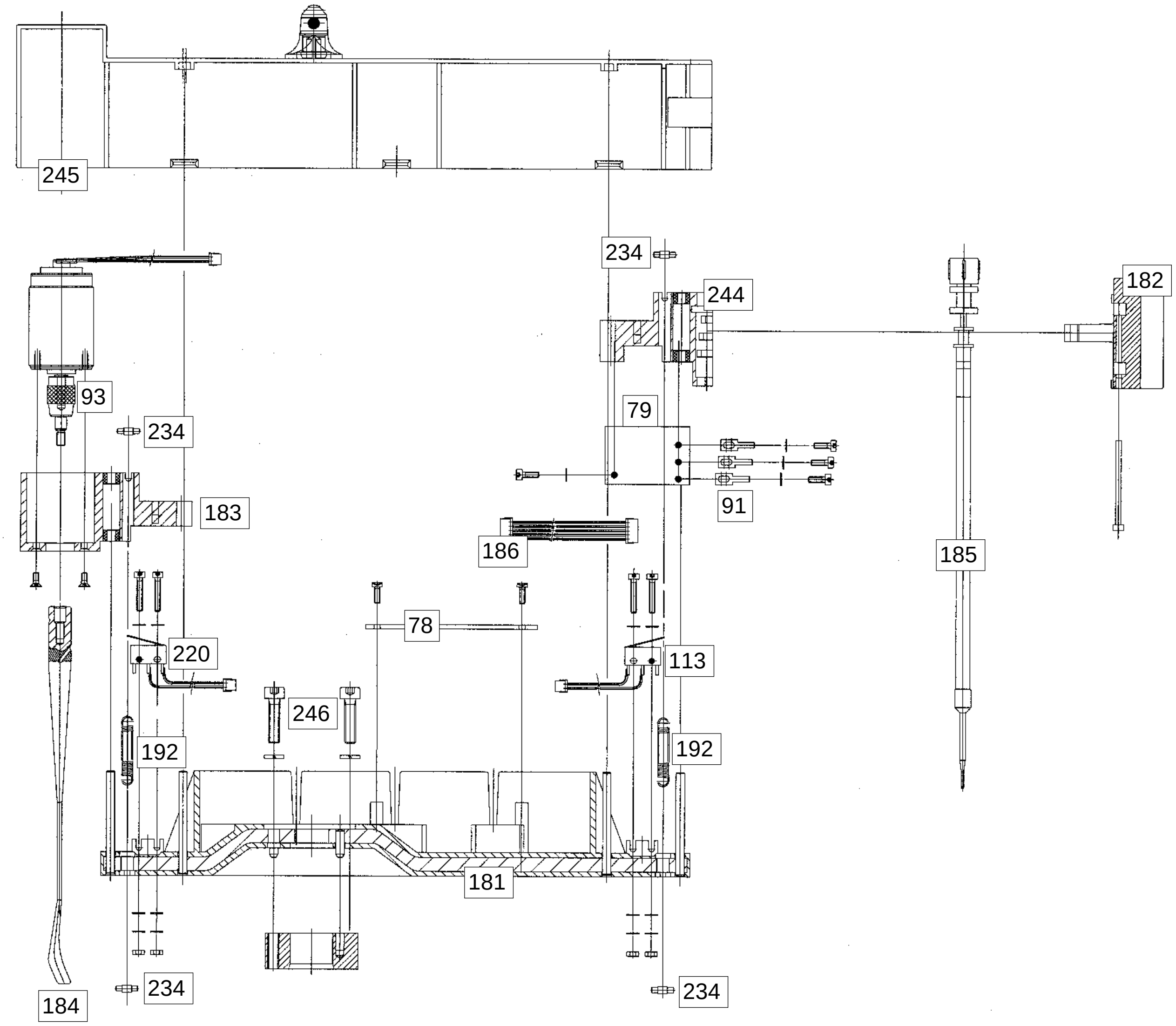
534	Clip
385	PCB DIST MFA
388	Cable MFA
535	Opening







388	Cable MFA
537	Groove
538	Hollow Shaft
539	Cable Guide
540	Shaft


245
234
182
244
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234
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183
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186
185
78
220
113
246
192
192
181
234
234
184

Fig. 2111-03

78 PCB LLD S/R
79 PCB Preamp LLD S/R
91 Contact Needle
93 Motor Assy Bead Mixer
113 Switch Sipper
181 Arm S/R
182 Holder Sipper Needle
183 Holder Bead Mixer
184 Bead Mixer
185 Needle S/R
186 Cable Preamp Sipper
192 Spring
220 Switch Sipper
234 Spring Holder
244 Needle Holder
245 Cover S/R Arm
246 Screws

4.2.7.3 Functional Description

The S/R arm transfers reagents, beads and samples from the S/R rotor to the incubator rotor. The S/R arm incorporates the S/R needle holder and the bead mixer. The S/R needle picks up the sample. The bead mixer ensures a homogeneous compound.

4.2.7.4 Tubings

The S/R needle has a tubing connection.
For further information, please refer to Chapter 3 Fluidics.

4.2.7.5 Service Procedures

Replaceable Components:

- PCB LLD S/R (78)
- PCB Preamp LLD S/R (79)
- Contact Needle (91)
- Motor Assy Bead Mixer (93)
- Switch Sipper (113)
- Arm S/R (181)
- Holder Sipper Needle (182)
- Holder Bead Mixer (183)
- Bead Mixer (184)
- Needle S/R (185)
- Cable Preamp Sipper (186)
- Spring (192)
- Switch Sipper (220)
- Spring Holder (234)
- Needle Holder (244)
- Cover S/R Arm (245)
- Tubing S/R 1.5 (410)

Dismounting the S/R Needle:

- Tubing S/R 1.5 (410).
- Open the Holder Sipper Needle (182).
- Remove the Needle S/R (185).

Dismounting the S/R Arm Assy:

- Remove the Needle S/R (185).
- Unscrew the Bead Mixer (184).
- Remove the Cover S/R Arm (245).
- Disconnect the Cable MFA (388) from the PCB.
- Loosen the screws (246).
- Remove the Arm S/R (181) by pulling it upward.

Dismounting the Cable MFA:

- For dismounting the Sipper Arm Assy, see above.
- For dismounting the MFA, see 4.2.6.
- Remove the Rubber Plug (530).
- Pull the Cable MFA (388) out downward.
- Remove the Screw (531) and Disk (532).
- Push the Clamp (533) upward and remove.
- Remove the Clip (534) by pressing the inner pin.
- Pull off the Cable MFA (388) and the PCB DIST MFA (385).
- Pull the Cable MFA (388) out through the Opening (535).
- Fold the Cable MFA (388) as the old Cable MFA (388).

Assembling the Cable MFA:

- Insert the Cable MFA (388) in the opening (535).
- Fix the Cable MFA (388) with the Clamp (533).
- The Cable MFA (388) has to be guided through the Groove (537).
- Position the MFA Assy (209) in the lower position.
- Insert the unfolded end of the Cable MFA (388) through the Hollow Shaft (538).
- Replace the Rubber Plug (530) ensuring that the Cable MFA (388) is not subject to tension.
- Wind the Cable MFA (388) 3 x counterclock-wise around the shaft (540).
- Insert the Cable MFA (388) in the Cable Guide (539) and fix with the Clip (534).
- Connect the Cable MFA (388) to the PCB DIST MFA (385).
- Fasten the Disk (532) with screws.
- Screw down the Arm S/R (181).
- Connect the Cable MFA (388) to the PCB LLD S/R (78).
- For reassembling the MFA, see 4.2.6

4.2.7.6 Wiring

see Chapter 5.3.3 Rotor/Rotor Module

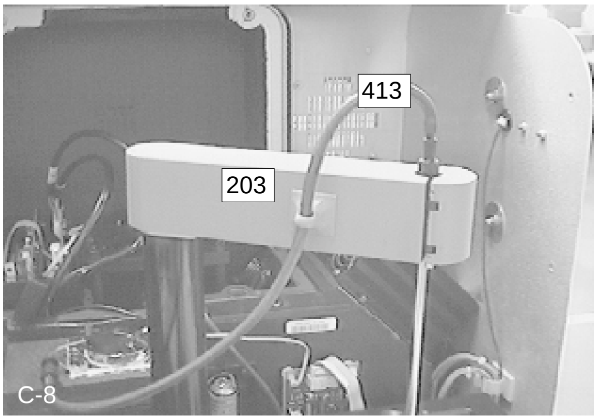
4.2.7.7 Additional Notes

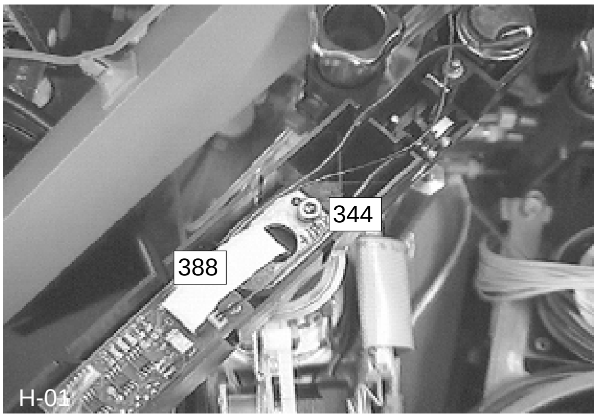
4.2.8 Sipper Arm

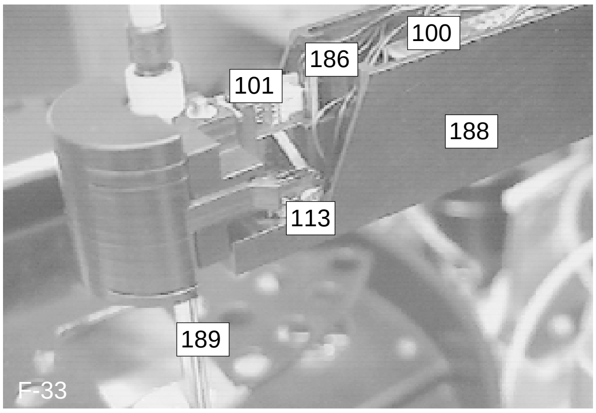
4.2.8.1 General Description

Elecsys 1010 incorporates a sipper arm, which constitutes the interface between the system and the incubate. It is easily accessible and easy to service. Defective parts can be easily replaced.

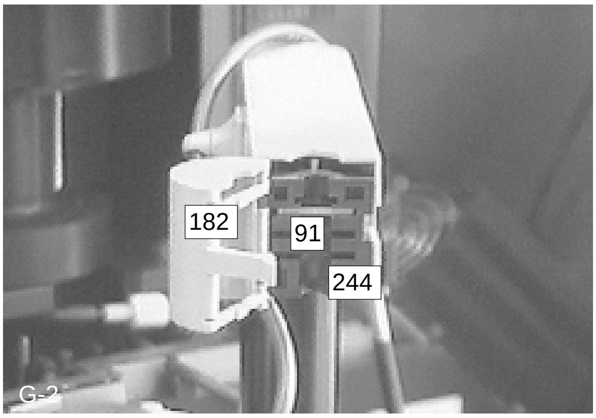
4.2.8.2 Location



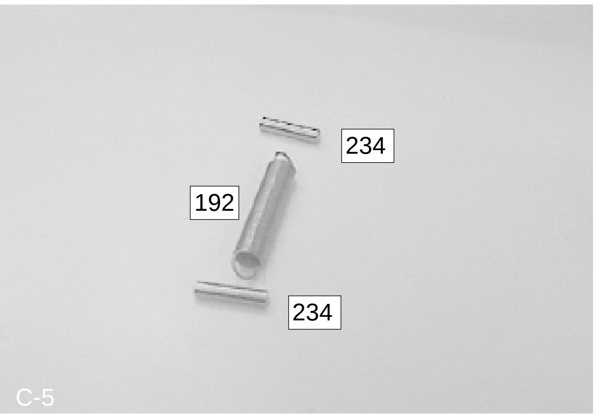




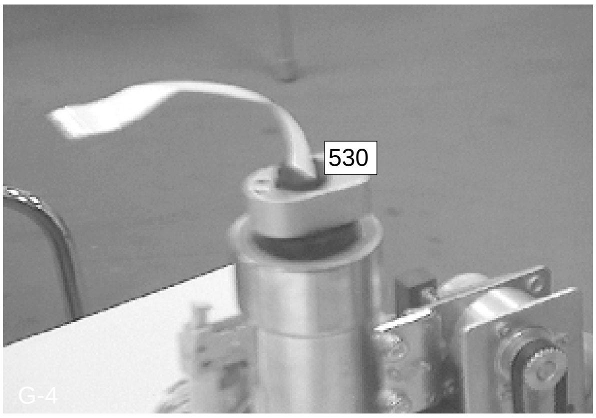
91	Contact Needle
100	PCB LLD Sipper
101	PCB Preamp LLD Sipper
113	Switch Sipper
182	Holder Sipper Needle
186	Cable Preamp Sipper

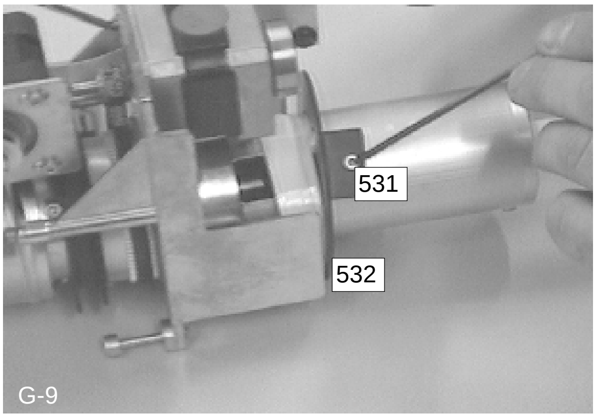


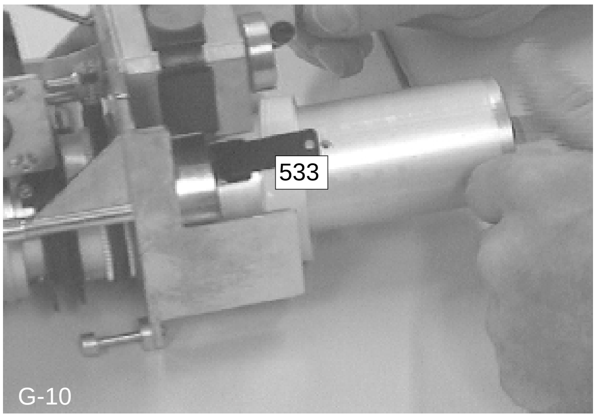
Note: On the Arm Sipper (188) only one (upper most) Contact Needle (91) is mounted!

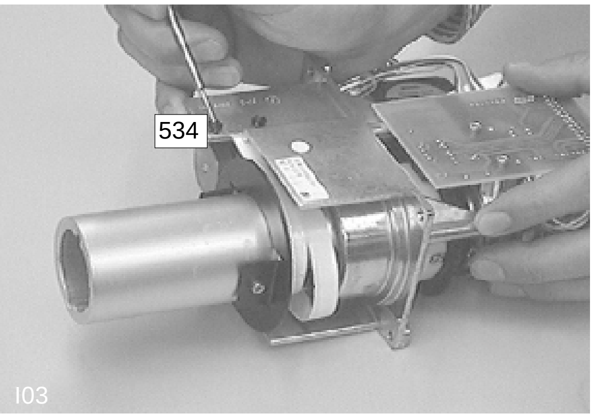


188	Arm Sipper
189	Needle Sipper
192	Spring
203	Cover Sipper Arm
234	Spring Holder
244	Needle Holder
344	Screw
388	Cable MFA
413	Tubing Sipper (1) 0.8

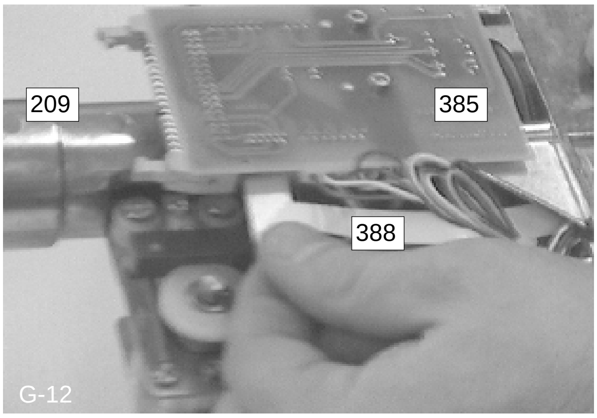


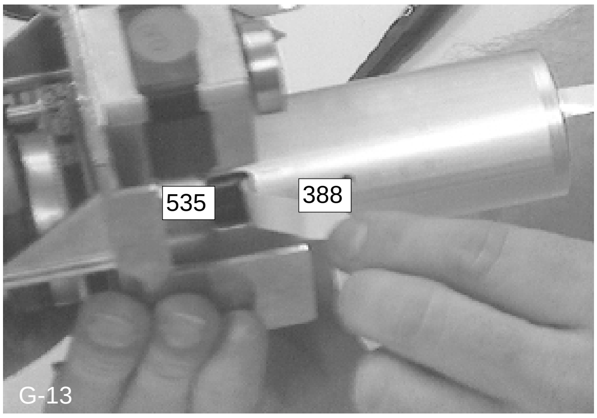


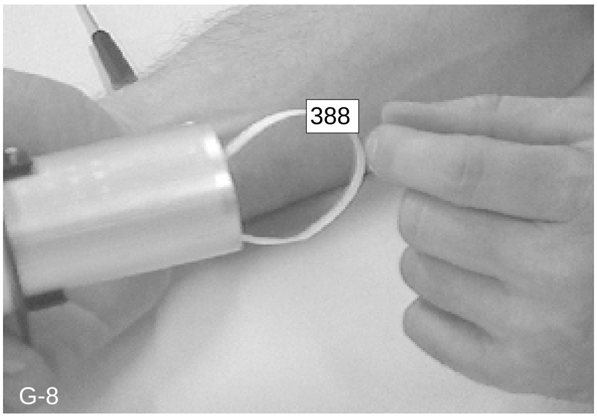




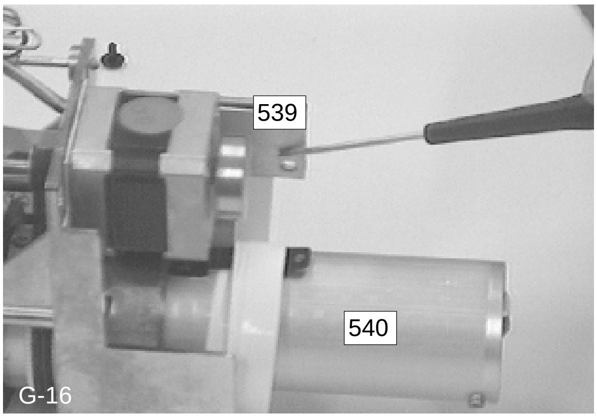
530	Rubber Plug
531	Screw
532	Disk
533	Clamp


209
385
388
G-12

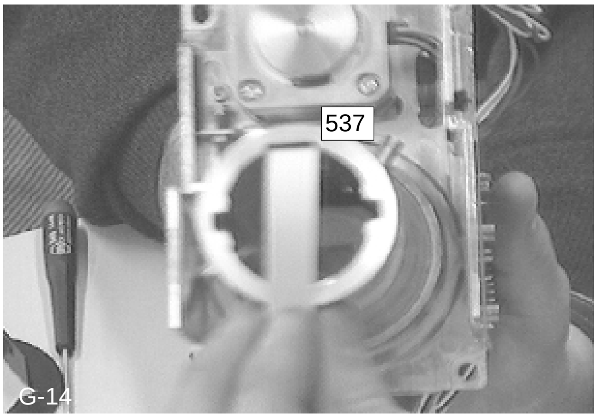




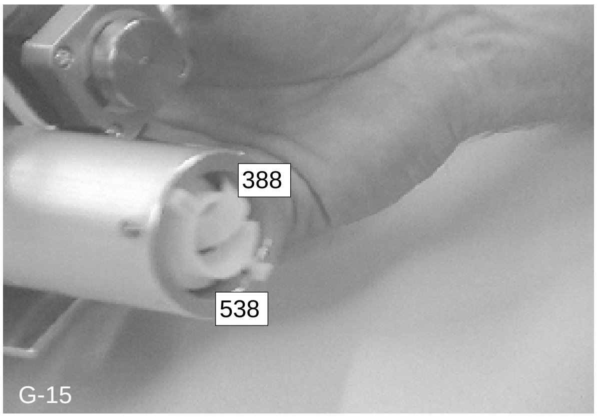
534	Clip
385	PCB DIST MFA
388	Cable MFA
535	Opening



G-16



G-14



G-15

388	Cable MFA
537	Groove
538	Hollow Shaft
539	Cable Guide
540	Shaft

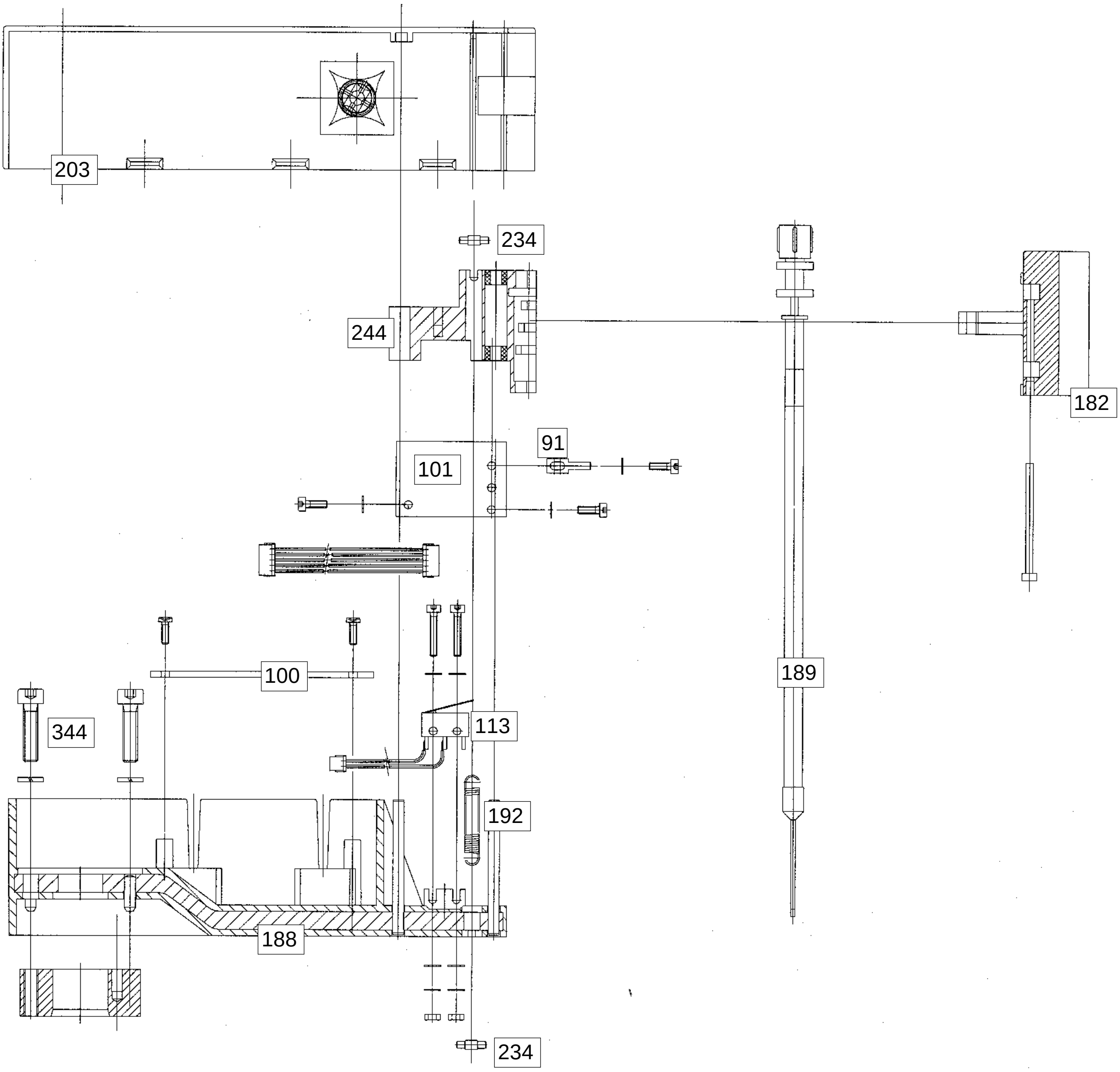

203
234
244
182
91
101
189
100
344
113
192
188
234

Fig. 2111-04

91	Contact Needle
100	PCB LLD Sipper
101	PCB Preamp LLD Sipper
113	Switch Sipper
182	Holder Sipper Needle
188	Arm Sipper
189	Needle Sipper
192	Spring
203	Cover Sipper Arm
234	Spring Holder
244	Needle Holder
344	Screw

4.2.8.3 Functional Description

The sipper arm transfers incubate, assay buffer and cell cleaner to the detection module.

4.2.8.4 Tubings

The sipper needle has a tubing connection.
For further information, please refer to Chapter 3 Fluidics.

4.2.8.5 Service Procedures

Replaceable Components:

- Contact Needle (91)
- PCB LLD Sipper (100)
- PCB Preamp LLD Sipper (101)
- Switch Sipper (113)
- Holder Sipper Needle (182)
- Cable Preamp Sipper (186)
- Arm Sipper (188)
- Needle Sipper (189)
- Spring (192)
- Cover Sipper Arm (203)
- Spring Holder (234)
- Needle Holder (244)
- Tubing Sipper (1) 0.8 (413)

Dismounting the Sipper Arm Assy:

- Undo the Sipper Tubing (1) 0.8 (413).
- Remove the Sipper Needle (189).
- Remove the Sipper Arm Cover (203).
- Disconnect the Cable MFA (388) from the PCB.
- Loosen the screws (344).
- Remove the Sipper Arm (188) by pulling it upward.

Dismounting the Cable MFA:

- For dismounting the Sipper Arm Assy, see above.
- For dismounting the MFA, see 4.2.6.
- Remove the Rubber Plug (530).
- Pull the Cable MFA (388) out downward.
- Remove the Screw (531) and Disk (532).
- Push the Clamp (533) upward and remove.
- Remove the Clip (534) by pressing the inner pin.
- Pull off the Cable MFA (388) and the PCB DIST MFA (385).
- Pull the Cable MFA (388) out through the Opening (535).
- Fold the new Cable MFA (388) according to the replaced one.

Assembling the Cable MFA:

- Insert the Cable MFA (388) in the opening (535).
- Fix the Cable MFA (388) with the Clamp (533).
- The Cable MFA (388) has to be guided through the Groove (537).
- Position the MFA Assy (209) in the lower position.
- Insert the unfolded end of the Cable MFA (388) through the Hollow Shaft (538).
- Replace the Rubber Plug (530) ensuring that the Cable MFA (388) is not subject to tension.
- Wind the Cable MFA (388) 3 x counterclock-wise around the shaft (540).
- Insert the Cable MFA (388) in the Cable Guide (539) and fix with the Clip (534).
- Connect the Cable MFA (388) to the PCB DIST MFA (385).
- Fasten the Disk (532) with screws.
- Screw down the Arm S/R (181).
- Connect the Cable MFA (388) to the PCB LLD Sipper (100).
- For reassembling the MFA, see 4.2.6

4.2.8.6 Wiring

see Chapter 5 Electronics.

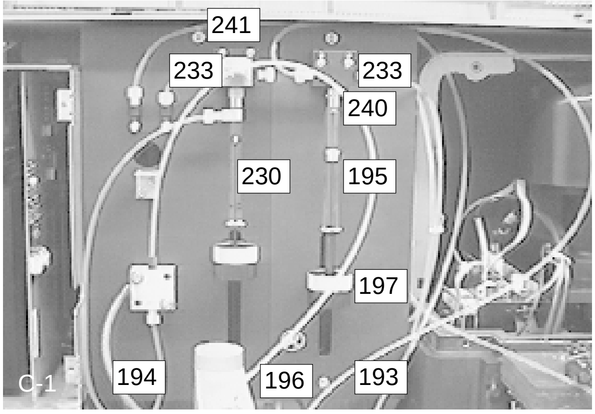
4.2.8.7 Additional Notes

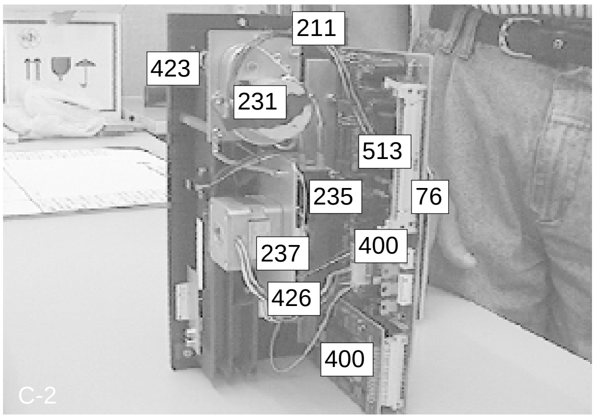
4.2.9 Dilutors

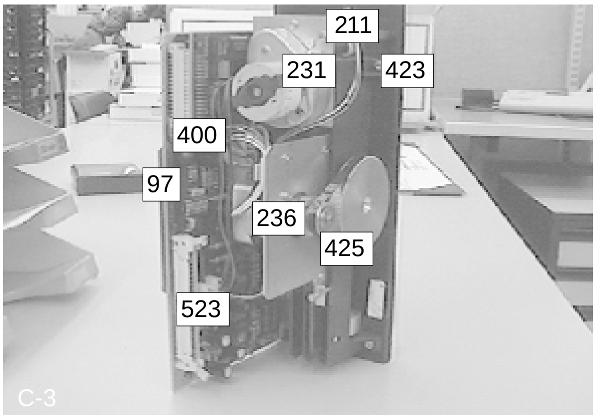
4.2.9.1 General Description

Elecsys 1010 incorporates two different dilutor assemblies: sample/reagent dilutor and sipper dilutor.
Each of the dilutors is a glass cylinder in which a piston reciprocates at defined steps. While the piston moves out liquid enters the cylinder and is drained when the piston moves in. The liquid displacement caused by the piston generates an exact volume.

4.2.9.2 Location







76	PCB Dilutor Reagent BP5
97	PCB Dilutor Sample BP2
193	Dilutor Assy S/R
194	Dilutor Assy Sipper
195	Syringe Sipper
196	Screw
197	Nut
211	Photosensor Dilutor
230	Syringe S/R
231	Valve Motor Dilutor
233	Valve Dilutor 3-2
235	Pump Sample Dilutor
236	Stepping Motor Z29 (Dilutor)
237	Stepping Motor Z30 (Dilutor)
240	Threaded Joint
241	Screw
400	PCB Controller, located on B2 and BP5
423	Photosensor Dilutor
425	Tooth Belt 87 Dilutor
426	Tooth Belt 87 Dilutor
513	Cable D6
523	Cable S5

4.2.9.3 Functional Description

Sample/Reagent Dilutor

Via the S/R needle, the S/R dilutor takes in samples, reagents and beads in a defined sequence.
The media are separated by air bubbles. The material is ejected through the needle into the incubation vessels. After that, the needle is rinsed with water from the system.

Sipper Dilutor

The sipper dilutor, which is located behind the cell, takes in incubate, assay buffer and cell cleaner during a detection cycle. After that, the needle is rinsed with water.

4.2.9.4 Tubings

For the tubing connections, please refer to Chapter 3 Fluidics.

4.2.9.5 Service Procedures

Replaceable Components:

- PCB Dilutor Reagent BP5 (76)
- PCB Dilutor Sample BP2 (97)
- Dilutor Assy S/R (193)
- Dilutor Assy Sipper (194)
- Syringe Sipper (195)
- Photosensor Dilutor (211)
- Syringe S/R (230)
- Valve Motor Dilutor (231)
- Valve Dilutor 3-2 (233)
- Pump Sample Dilutor (235)
- Stepping Motor Z29 (Dilutor) (236)
- Stepping Motor Z30 (Dilutor) (237)
- PCB Controller (400), located on BP2 and BP5
- Photosensor Dilutor (423)
- Tooth Belt 87 Dilutor (425)

- Tooth Belt 87 Dilutor (426)
- Cable D6 (513)
- Cable S5 (523)

Dismounting the Dilutor Assemblies:

- Disconnect the pressure sensor plug from the PCB.
- Disconnect the tubing.
- Loosen the screws (196).
- Disconnect the cables.
- Remove the Dilutor.

Dismounting the Syringes:

The sipper and S/R syringes have different volumes: sipper syringe 250 µl, S/R syringe 2.5 ml.
The syringes are precision instruments. Care should be taken when mounting or dismounting them, as they are very fragile. The pistons should be wetted with water before mounting.

- Loosen the Threaded Joint (240).
- Pull the piston downwards.
- Loosen the Nut (197).
- Remove the syringe.
- ***NOTE: To mount proceed in the following sequence:***
  - ***First, put the syringe in place.***
  - ***Tighten the Nut (197) fingertight.***
  - ***Pull the piston upwards and screw it in the Threaded Joint (240).***

Dismounting the Valve:

- Dismount the syringe.
- Disconnect the tubing.
- Loosen the screws (241).
- Remove the Dilutor Valve 3-2 (233).
- ***NOTE: When remounting, ensure the journal of the shaft is located in the groove.***

4.2.9.6 Wiring

see Chapter 5 Electronics

4.2.9.7 Additional Notes

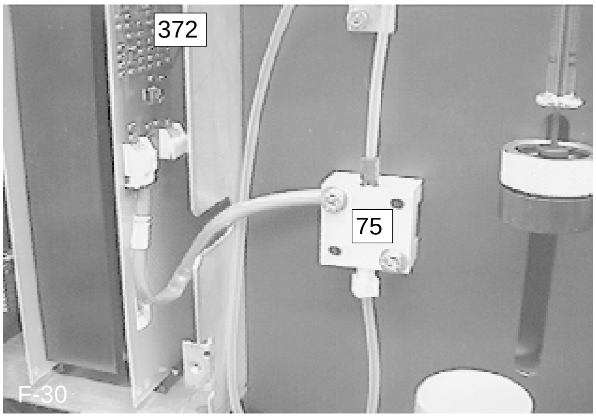
✎

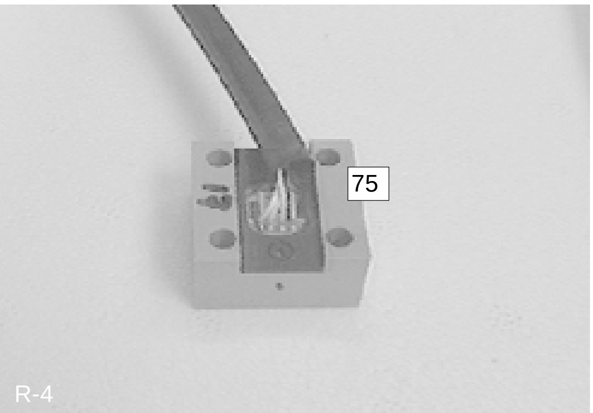
4.2.10 Pressure Sensor (Clot Sensor)

4.2.10.1 General Description

The pressure sensor detects the pressures in the tubing system that are generated during the liquid intake on the dilutor side.

4.2.10.2 Location





75	Pressure Sensor Assy
372	Cover

4.2.10.3 Functional Description

A difference pressure transducer compares the pressure profiles generated during sipping with those stored in the system. The pressure sensor is primed with deionized water. Samples, reagents, etc., will not enter the pressure sensor as they will cause damage.

4.2.10.4 Tubings

The pressure sensor has an inlet and outlet.
For further information, please refer to Chapter 3 Fluidics.

4.2.10.5 Service Procedures

Replaceable Components:

- Pressure Sensor Assy (75)

Dismounting the Pressure Sensor

- Loosen the screws.
- Open the Cover (372).
- Disconnect the plug of the pressure sensor from the PCB.
- ***NOTE: The pressure sensor will be damaged if exposed to overpressure. Ensure correct valve position.***

4.2.10.6 Wiring

The pressure sensor has a cable connection to the PCB Clot Detection Module B7.
For further information, please refer to Chapter 5 Electronics.

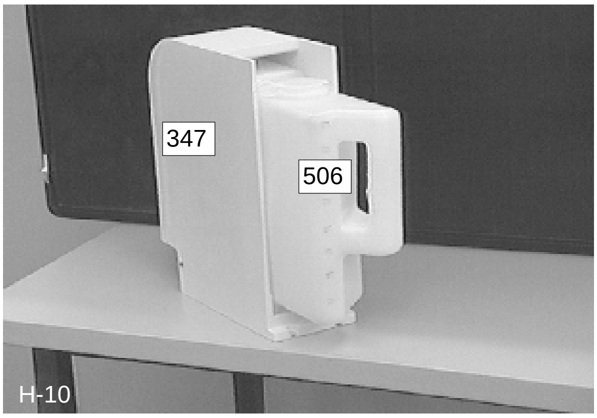
4.2.10.7 Additional Notes

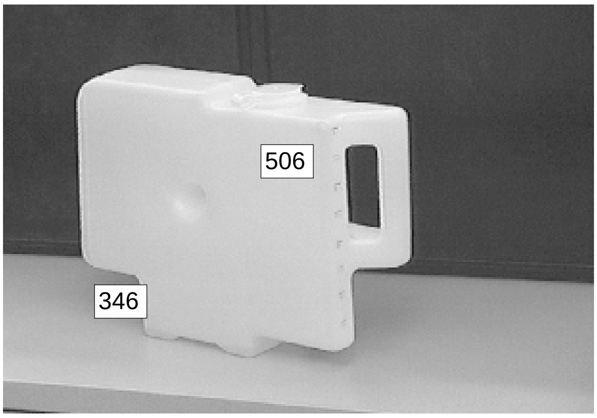
4.2.11 Water Supply Module

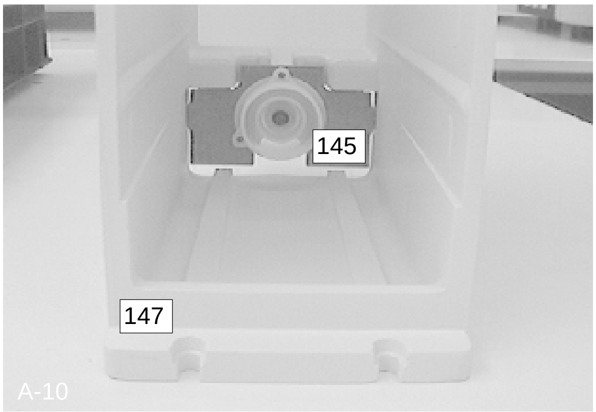
4.2.11.1 General Description

Elecsys 1010 incorporates a water supply module that contains the bottle for distilled water which supplies distilled water to the wash stations.

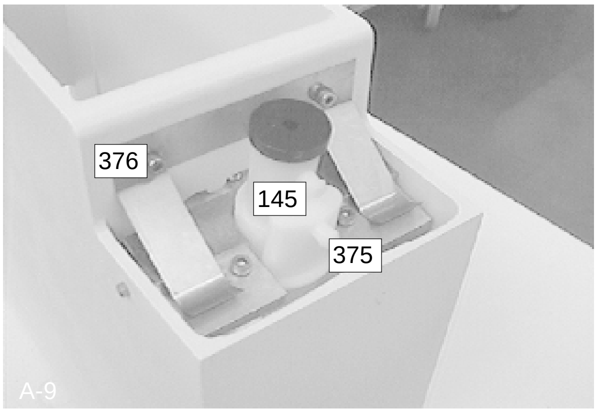
4.2.11.2 Location







145	Water Valve Instrument Side
147	Screw
346	Water Valve Bottle Side
347	Water Bottle Housing
375	Tubing
376	Screw
506	Distilled Water Bottle



4.2.11.3 Functional Description

The water (deionized water) contained in the water bottle operates the entire fluidics. The bottle has a capacity of 4.2 liters.

4.2.11.4 Tubings

The water bottle housing has a tubing connection to the filter on the waste/water distributor.
For further information, please refer to Chapter 3 Tubings

4.2.11.5 Service Procedures

Replaceable Components:

- Water Valve Instrument Side (145)
- Water Valve Bottle Side (346)
- Water Bottle Housing (347)
- Distilled Water Bottle (506), included in Set 2, see Chapter 8

Dismounting the Water Bottle Housing:

- Remove the Distilled Water Bottle (506).
- Loosen the screws (147).
- Pull the Water Bottle Housing (347) out to the front.
- Pull off the Tubing (375).
- ***NOTE: Empty the Distilled Water Bottle (506) completely before refilling.***

Dismounting the Water Valve Instrument Side

- Loosen the screws (376).
- Remove the Water Valve Instrument Side (145).

4.2.11.6 Wiring

NA

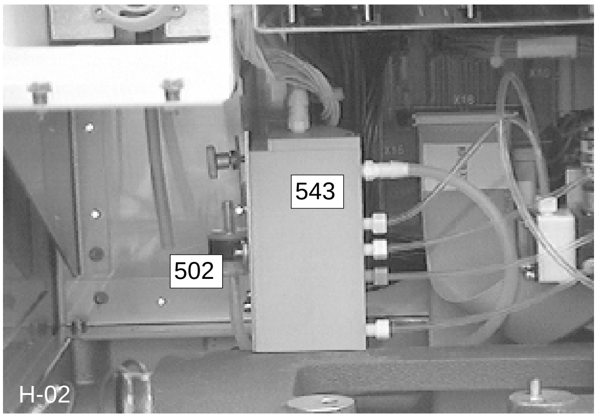
4.2.11.7 Additional Notes

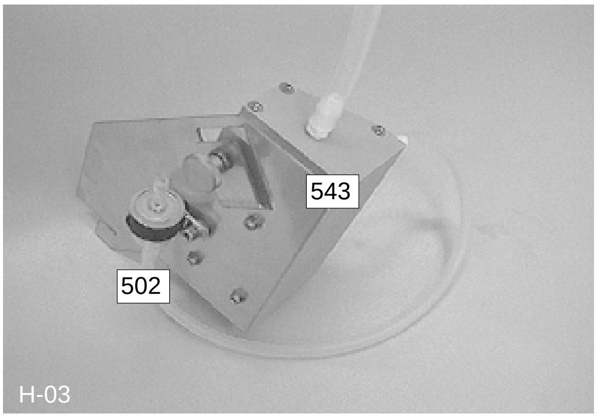
4.2.12 Buffer Tank

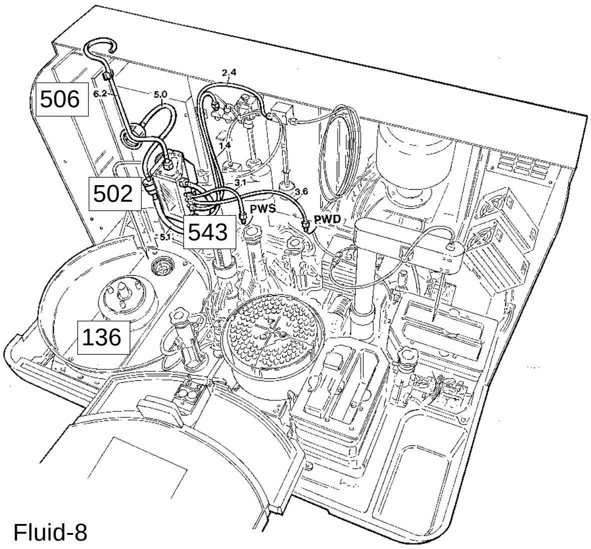
4.2.24.1 General Description

The Buffer Tank distributes the water in the system.

4.2.25.2 Location







Fluid-8

136	Sample Roror Drive (S/R Drive)
502	Water Filter
506	Destilled Water Bottle
543	Buffer Tank

4.2.25.3 Functional Description

The Buffer Tank distributes the water arriving from the Destilled Water Bottle to the membrane pump PWS, PWD and to the Dilutors.
A important assignment is the reduction of the bubbles from the system water. A water filter is mounts at the side from the Buffer Tank. The Filter CT wash system eliminates pollution.

4.2.25.4 Tubings

The Buffer Tank has one inlet and five outlests (four outlets for system water, one outlet for ventilation).
For further information, please refer to Chapter 3 Fluidics.

4.2.25.5 Service Procedures

Replaceable Components:

- Filter CT Wash system SET2 (502)
- Buffer Tank (543)

Dismounting the Buffer Tank:

- Remove the Destilled Water Bottle (506)
- Remove the S/R Rotor Assy(140), see Chapter 4.2.20
- Disconnect the cables and remove the Sample Rotor Drive (S/R Drive)(136), see Chapter 4.2.20
- Loosen the screw underneath the "Water Bottle Housing"
- take down the tubing input filter
- careful pull out the unity at the front
- unscrew the Filter CT Wasch system SET2 (502)

4.2.24.6 Wiring

see Chapter 5 Electronics

4.2.24.7 Additional Notes

4.2.13 Pumps and Valves

4.2.13.1 General Description

Elecsys 1010 incorporates a Liquid System including the following pumps and valves:

Pumps in the Fluid Station:

- Membrane Pump PWS
- Membrane Pump PWD

Valves in the Fluid Station:

- Magnet Valve 3-Way B1/D2/D1
- Magnet Valve Assy VAD2/VAB1
- Magnet Valve VWS1

Pumps in the S/R Dilutor:

- Membrane Pump Dilutor

Valves in the Dilutors:

- Valve Dilutor 3-2

Valve at Wash Station WD 1:

- Pinch Valve VAD1

Valve on the Detection Module:

- Magnet Valve Assy VAD2/VM1

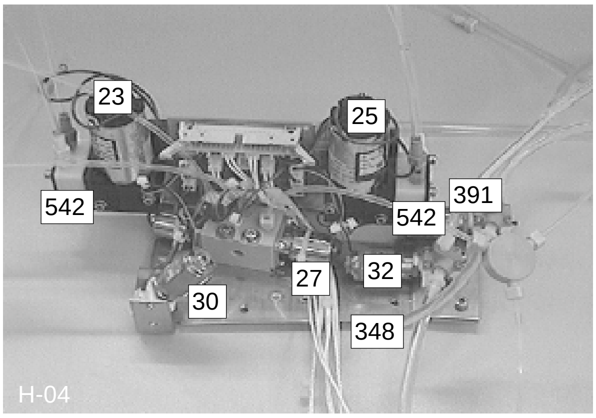
Valve at Wash Station WS 1:

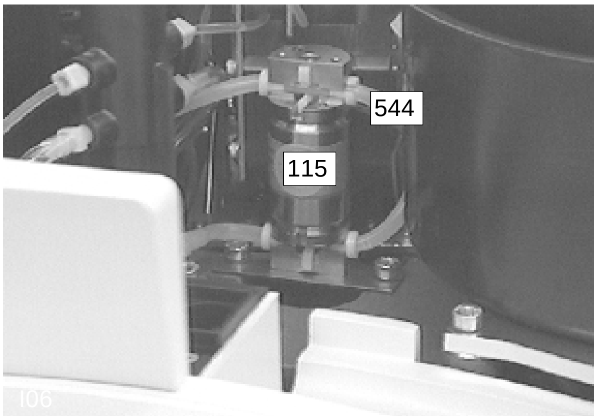
- Magnet Valve VAS 1

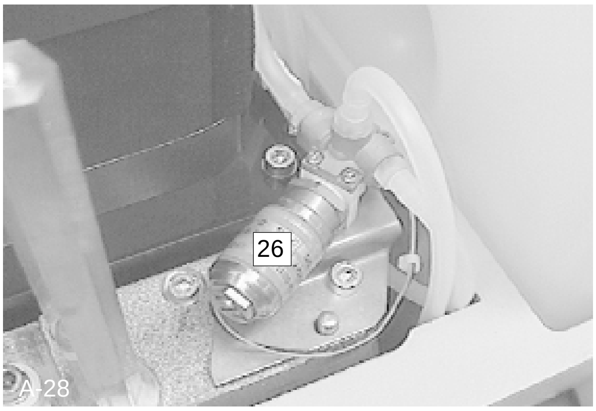
Pumps in the Waste Module:

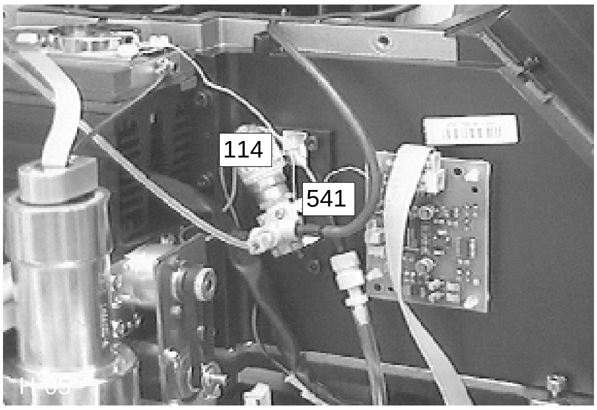
- Waste Pump

4.2.13.2 Location









23	Membrane Pump PWS/PWD
25	Membrane Pump PWS/PWD
26	Magnet Valve VAS1
27	Magnet Valve 3-Way B1/D2/D1
30	Magnet Valve VWS1
32	Magnet Valve Assy VAD2/VAB1
115	Pinch Valve VAD1
114	Magnet Valve Assy VM1
348	Valve Block
391	Magnet Valve Assy VAD2/VAB1
541	Restrictor Tubing
542	Pump Head
544	Pinch Tubing (is also included in Set 2, see Chapter 8)

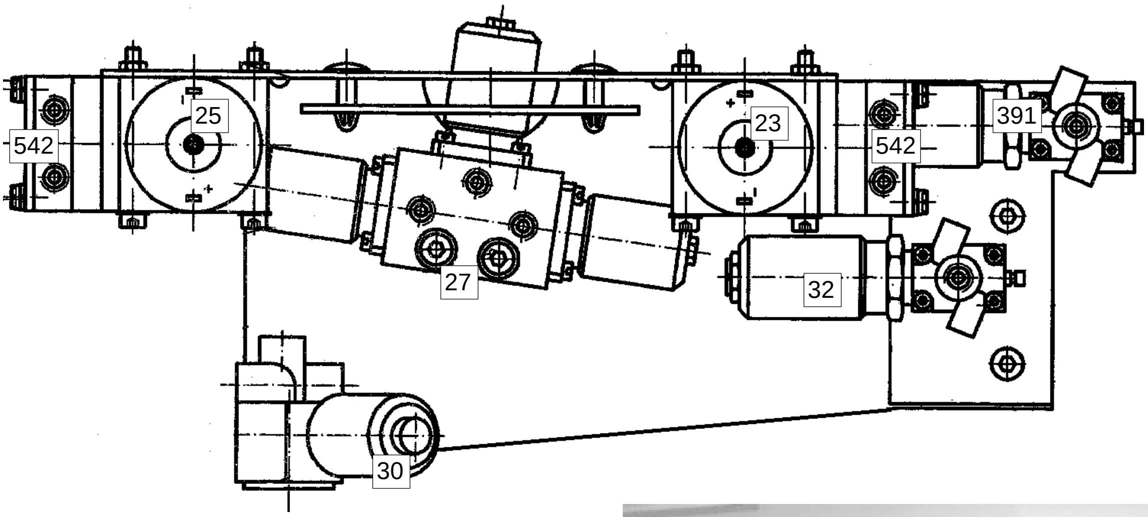
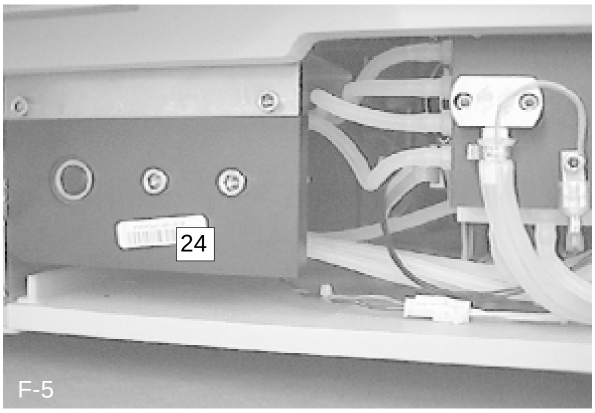

25
542
23
542
391
27
32
30

Fig. Fluid-1b



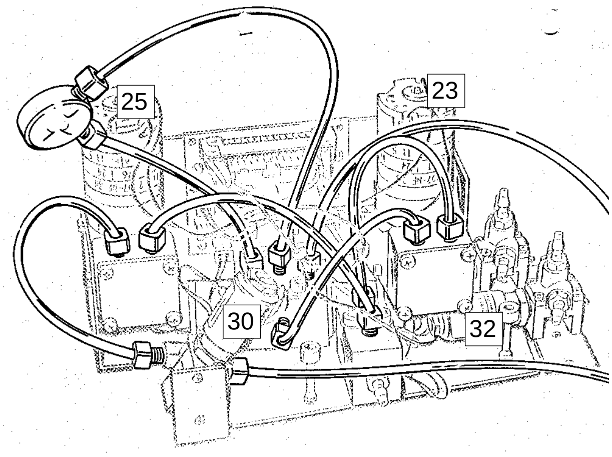
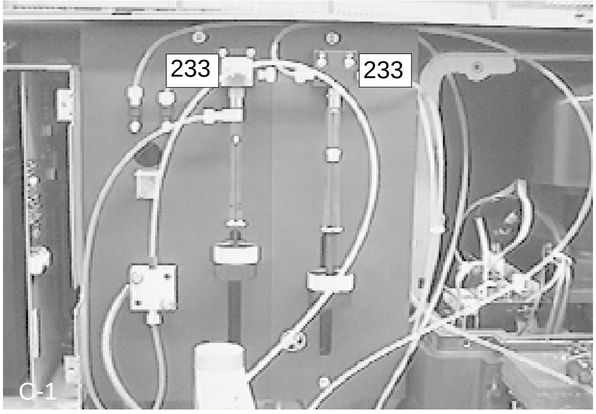
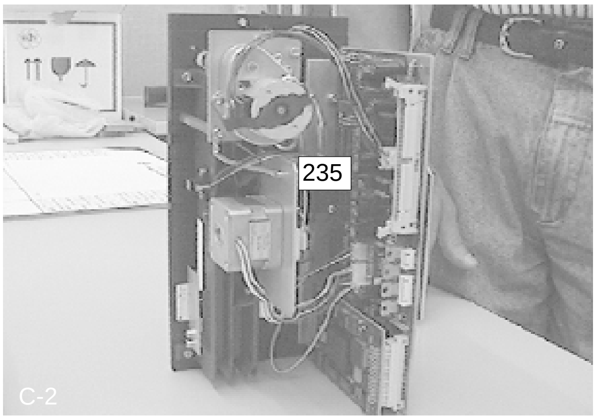


Fig. Fluid-2

23	Membrane Pump PWS/PWD
25	Membrane Pump PWS/PWD
27	Magnet Valve 3-Way B1/D2/D1
30	Magnet Valve VWS1
32	Magnet Valve Assy VAD2/VAB1
391	Magnet Valve Assy VAD2/VAB1
542	Pump Head

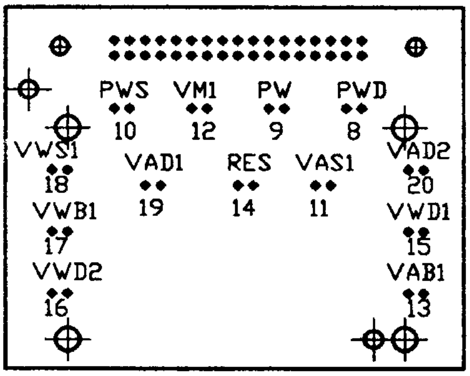




24	Waste Pump
233	Valve Dilutor 3-2
235	Pump Sample Dilutor

Fluid Station

ITEM	DESCRIPTION	LOCATION
8	PWD	MAIN WASH PUMP
9	PW	WASTE PUMP
10	PWS	SIPPER (BLACK) WASH PUMP
11	VAS1	SIPPER (BLACK) WASH STATION DRAIN VALVE
12	VM1	MEASUREMENT MODULE 3-WAY VALVE
13	VAB1	RED WASH STATION 3-WAY DRAIN VALVE
14	RES	RESERVED
15	VWD1	BLUE WASH STATION DI SUPPLY
16	VWD2	GREEN WASH STATION DI SUPPLY
17	VWB1	RED WASH STATION DI SUPPLY
18	VWS1	BLACK WASH STATION DI SUPPLY
19	VAD1	BLUE STATION 3-WAY PINCH VALVE
20	VAD2	GREN WASH STN 3-WAY DRAIN VALVE


PWS
VM1
PW
PWD
10
12
9
8
VWS1
18
VAD1
19
RES
14
VAS1
11
VAD2
20
VWB1
17
VWD1
15
VWD2
16
VAB1
13

RED = BEAD WASH STATION
GREEN = S/R WASH (BACK) STATION
BLACK = SIPPER (MEASUREMENT) WASH STATION
BLUE = S/R WASH (FRONT) STATION

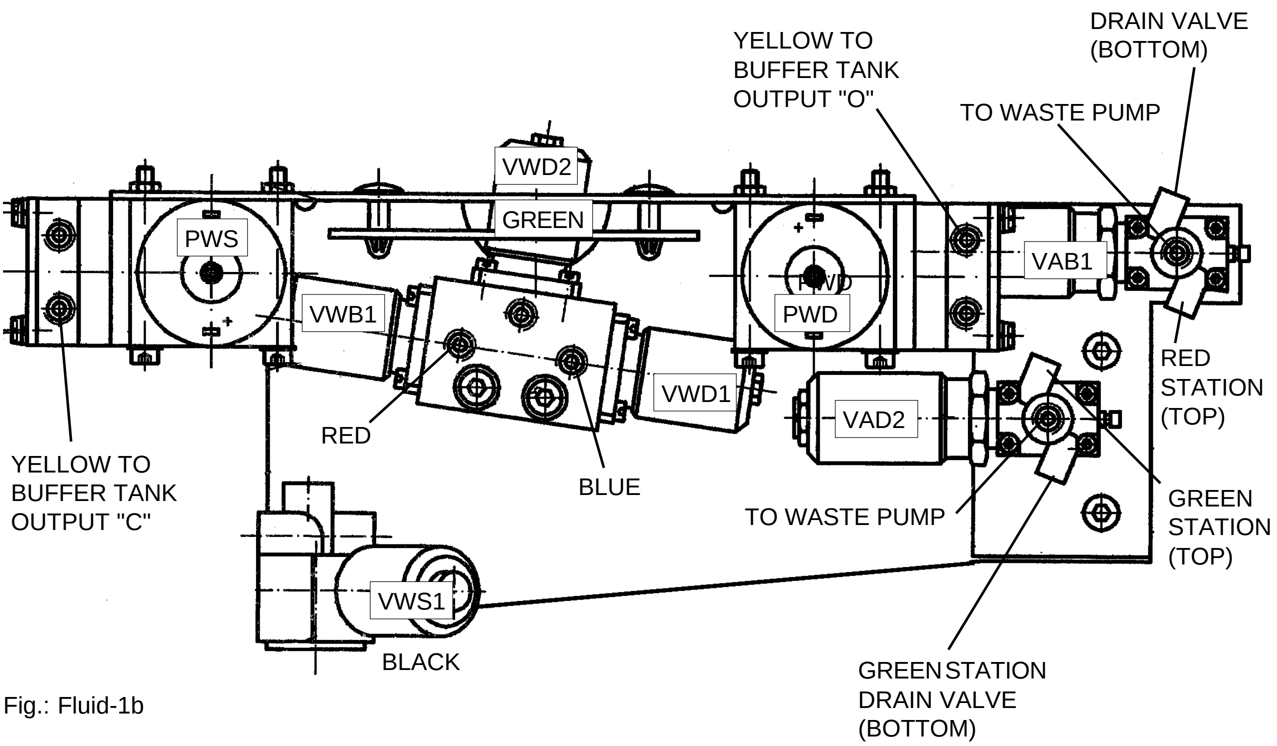

RED STATION DRAIN VALVE (BOTTOM)
YELLOW TO BUFFER TANK OUTPUT "O"
TO WASTE PUMP
VWD2
GREEN
PWS
VWB1
PWD
VAB1
VWD1
VAD2
RED STATION (TOP)
RED
BLUE
YELLOW TO BUFFER TANK OUTPUT "C"
TO WASTE PUMP
GREEN STATION (TOP)
VWS1
BLACK
GREEN STATION DRAIN VALVE (BOTTOM)

Fig.: Fluid-1b

4.2.13.3 Functional Description

The two membrane pumps PWS and PWD are identical in design and supply the wash stations with water.

The membrane pump PWD supplies the three magnet valves 3-way B1/D2/D1, which supply the wash stations:

- Magnet Valve 3-Way B1/D2/D1 supplies Wash Station WB1.
- Magnet Valve 3-Way B1/D2/D1 supplies Wash Station WD2.
- Magnet Valve 3-Way B1/D2/D1 supplies Wash Station WD1.

4.2.13.4 Tubings

See Chapter 3 Fluidics.

4.2.13.5 Service Procedures

Replaceable Components:

- Membrane Pump PWS/PWD (25)
- Membrane Pump PWS/PWD (23)
- Magnet Valve 3-Way B1/D2/D1 (27)
- Magnet Valve VWS1 (30)
- Magnet Valve Assy VAD2/VAB1 (32)
- Magnet Valve Assy VAD2/VAB1 (391)
- Pump Sample Dilutor (235), see Chapter 4.2.9 Dilutors
- Dilutor Valve 3-2 (233), see Chapter 4.2.9 Dilutors
- Pinch Valve VAD1 (115)
- Magnet Valve Assy VAD2/VAB1 (114), see Chapter 4.2.4 Detection Module
- Waste Pump (24), see Chapter 4.2.18 Waste Module
- Magnet Valve VAS1/VM1 (26)
- Pump Head (542)
- Pinch Tubing (544) (is also included in Set 2, see Chapter 8)

Dismounting the Valve Block of the S/R System:

- Disconnect the cables and tubings.
- Loosen the screws (349).
- Remove the Valve Block (348) by lifting it upwards.

4.2.13.6 Wiring

See Chapter 5 Electronics.

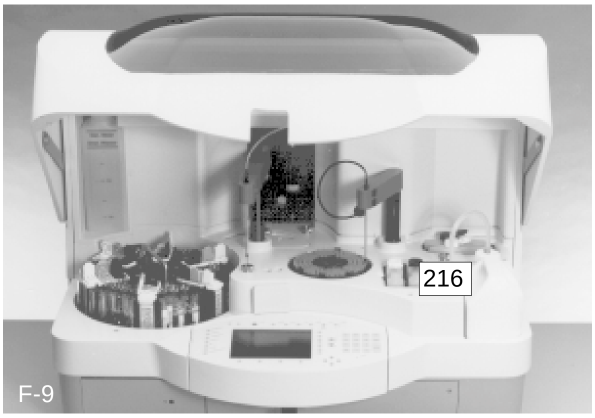
4.2.13.7 Additional Notes

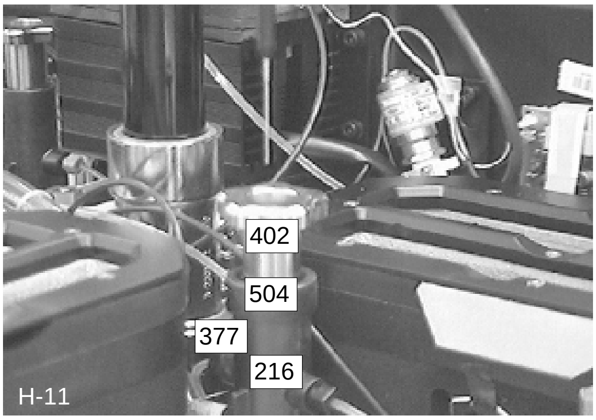
4.2.14 Wash Station S

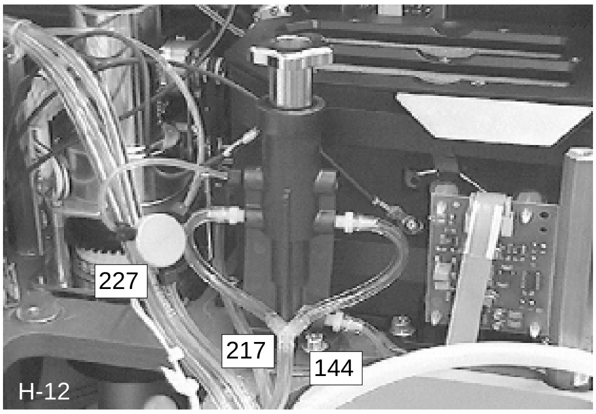
4.2.14.1 General Description

In the wash station S, the sipper needle is rinsed with water.

4.2.14.2 Location







144	Screw
216	Wash Station S
217	Y-Piece
227	Y-Piece
377	Ground Cable Wash Station WS1
402	Insert Wash Station S/D1/D2
504	O-Ring

4.2.14.3 Functional Description

The 3/2-way magnet valve VAS1 controls the draining of the wash station and is driven with 24V. In the absence of current it is closed.
The 2/2-way magnet valve VWS1 the filling of the wash station and is driven with 24V. In the absence of current it is closed.

There are three functional states for the valves and pumps for the operation of Wash Station S:

Normal position:

- Waste Pump WP off
- Valve VWS1 off - closed
- Valve VAS1 in normal position 1/3 (level adjustment)
- Pump PWS off

Working position - Wash:

- Waste Pump WP on
- Valve VWS1 on - open
- Valve VAS1 in normal position 1/3 (level adjustment)
- Pump PWS on

Working position - Drain:

- Waste Pump WP on
- Valve VWS1 on - open
- Valve VAS1 in position 2/3 (valve reversed, lower level)
- Pump PWS on

4.2.14.4 Tubings

Wash station S has two inlets and three outlets.
For further information, please refer to Chapter 3 Fluidics.

4.2.14.5 Service Procedures

Replaceable Components:

- Insert Wash Station D1/D2/S (402)
- Wash Station S (216)
- Y-Piece (217), included in Set 5, see Chapter 8
- Y-Piece (227), included in Set 5, see Chapter 8
- O-Ring (504), included in Set 2, see Chapter 8

Dismounting the Wash Station:

- Disconnect the tubing.
- Pull off the Ground Cable (377).
- Loosen the screws (144).
- Remove Wash Station S (216).
- ***NOTE: When remounting, the wash station will have to be readjusted, see Chapter 6 Software.***

Dismounting the Wash Station Insert:

The wash station insert is screwed in the wash station.

4.2.14.6 Wiring

Wash Station S has a ground cable connection.
For further information, please refer to Chapter 5 Electronics.

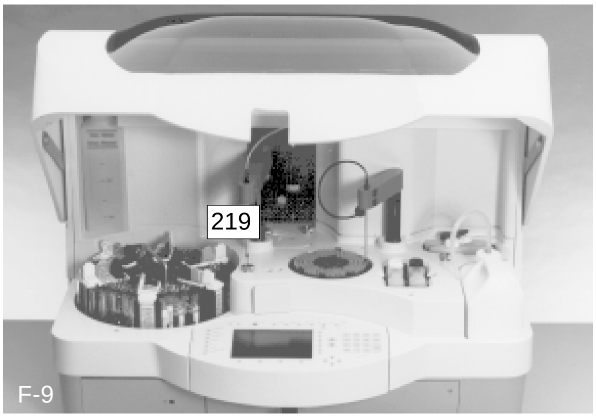
4.2.14.7 Additional Notes

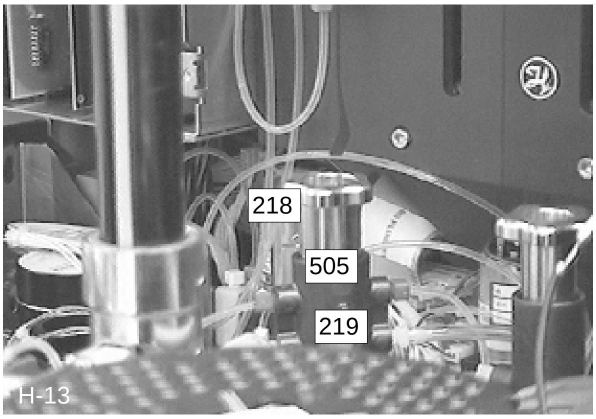
4.2.15 Wash Station B

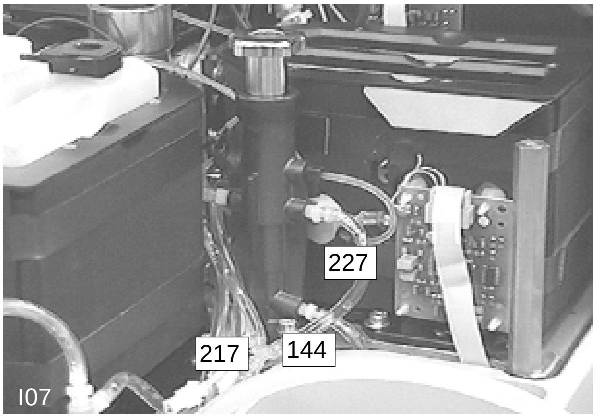
4.2.15.1 General Description

In wash station B the bead mixer is rinsed with water.

4.2.15.2 Location







144	Screw
217	Y-Piece
218	Insert Wash Station B
219	Wash Station B
227	Y-Piece
505	O-Ring

4.2.15.3 Functional Description

The wash station uses two valves. The 3/2-way magnet valve VAB1 controls the draining of the wash station and is driven with 24 V. In the absence of current it is closed. Filling takes place via the 3-way magnet valve B1/D2/D1 which is located on the valve block of the S/R system.

There are three functional states for the valves and pumps for the operation of wash station B:

Normal position:

- Waste Pump WP off
- Valve VWB1 on valve block S/R system off - closed
- Pump PWD off

Working position - Wash:

- Waste Pump WP on
- Valve VWB1 on valve block S/R system on - open
- Valve VAB1 in normal position 1/3 (level adjustment)
- Pump PWD on

Working position - Drain:

- Waste Pump WP on
- Valve VWB1 on - open
- Valve VAB1 in position 2/3 (magnet reversed, lower level)
- Pump PWD on

4.2.15.4 Tubings

Wash Station B has two inlets and three outlets.
For further information, please refer to Chapter 3 Fluidics.

4.2.15.5 Service Procedures

Replaceable Components:

- Insert Wash Station B (218)
- Wash Station B (219)
- Y-Piece (217), included in Set 5, see Chapter 8
- Y-Piece (227), included in Set, see Chapter 8
- O-Ring (505), included in Set 2, see Chapter 8

Dismounting the Wash Station:

- Disconnect the tubing.
- Loosen the screws (144).
- Remove Wash Station B (219).
- ***When remounting, the wash station will have to be readjusted, see Chapter 6 Software.***

Dismounting the Wash Station Insert :

The wash station insert is screwed in the wash station.

4.2.15.6 Wiring

NA

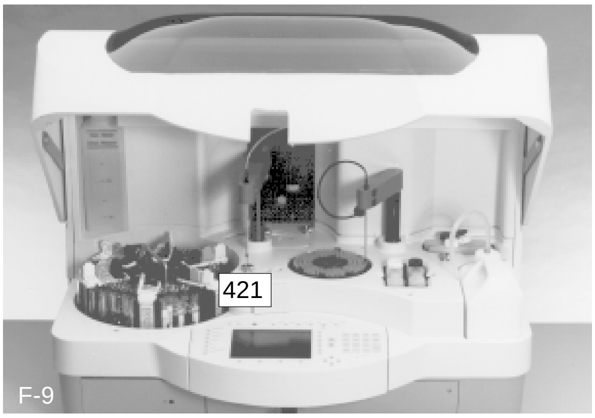
4.2.15.7 Additional Notes

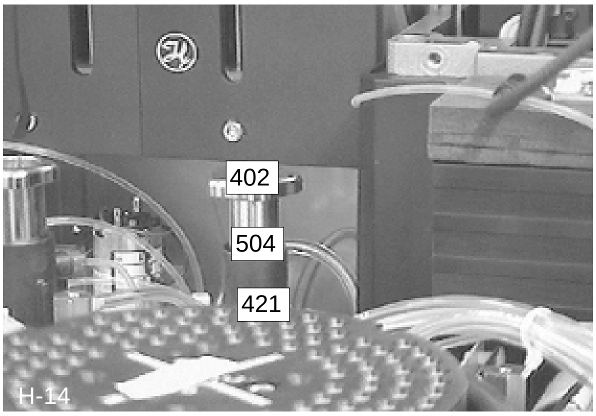
4.2.16 Wash Station D2

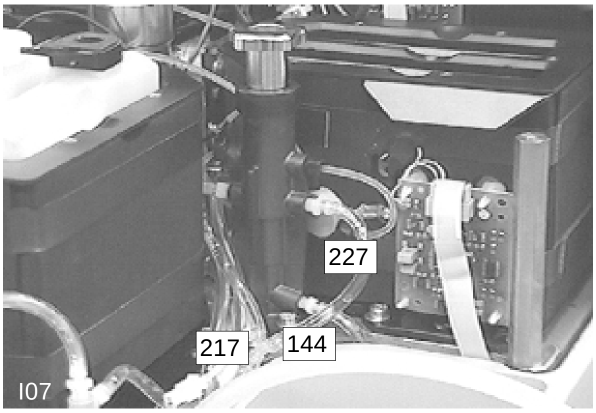
4.2.16.1 General Description

In the wash station D2, the S/R needle is rinsed with water.

4.2.16.2 Location







144	Screw
217	Y-Piece
227	Y-Piece
402	Insert Wash Station S/D1/D2
421	Wash Station D1/D2
504	O-Ring

4.2.16.3 Functional Description

The wash station needs two valves for operation. The 3/2 magnet valve VAD2 - driven with 24V - controls the draining of the wash station. In the absence of current it is closed.
Filling is controlled by the magnet valve 3-way B1/D2/D1, which is located on the valve block S/R system.

There are three functional states for the valves and pumps for the operation of wash station D1/D2:

Normal position:

- Waste pump WP off
- Valve VWD2 on valve block S/R system off - closed
- Valve VAD2 in normal position 1/3 (level adjustment)
- Pump PWD off

Working position - Wash:

- Waste Pump WP on
- Valve VWD2 on valve block S/R system on - open
- Valve VAD2 in normal position 1/3 (level adjustment)
- Pump PWD on

Working position - Drain:

- Waste Pump WP on
- Valve VWD2 on - open
- Valve VAD2 in position 2/3 (magnet reversed, lower level)
- Pump PWD on

4.2.16.4 Tubings

The wash station has two inlets and three outlets.
For further information, please refer to Chapter 3 Fluidics.

4.2.16.5 Service Procedures

Replaceable Components:

- Insert Wash Station D1/D2/S (402)
- Wash Station D1/D2 (421)
- Y-Piece (217), included in Set 5, see Chapter 8
- Y-Piece (227), included in Set 5, see Chapter 8
- O-Ring (504), included in Set 2, see Chapter 8

Dismounting the Wash Station:

- Disconnect the tubing.
- Loosen the screws (144).
- Remove Wash Station D1/D2 (421).
- ***NOTE: When remounting, the wash station will have to be readjusted, see Chapter 6 Software.***

Dismounting the Wash Station Insert:

The wash station insert is screwed in the wash station.

4.2.16.6 Wiring

NA

4.2.16.7 Aditional Notes

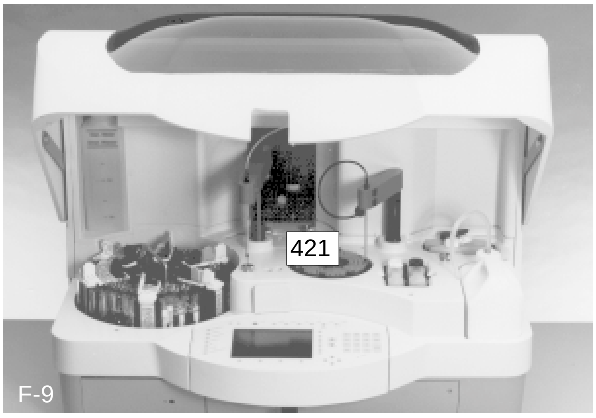
✎

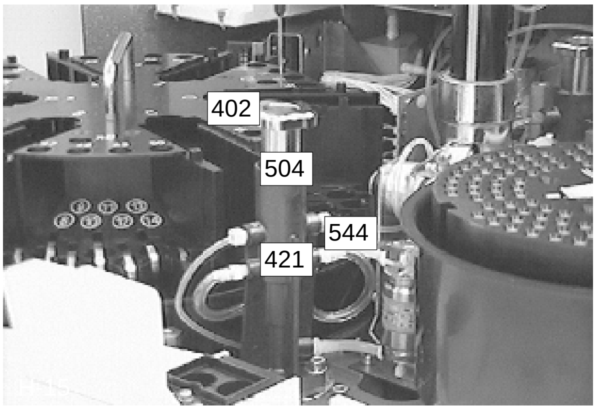
4.2.17 Wash Station D1

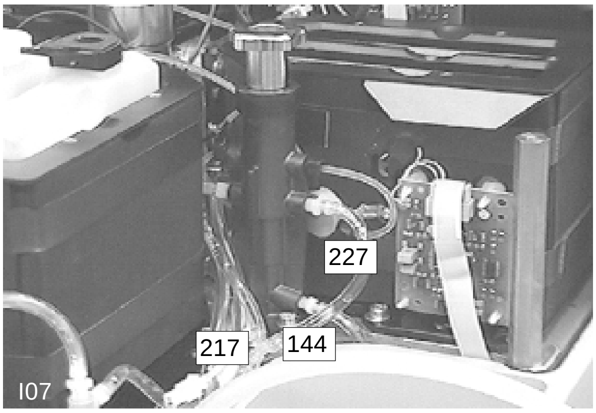
4.2.17.1 General Description

In the wash station D1, the S/R needle is rinsed with water.

4.2.17.2 Location







144	Screw
217	Y-Piece
227	Y-Piece
402	Insert Wash Station S/D1/D2
421	Wash Station D1/D2
504	O-Ring
544	Pinch Tubing

4.2.17.3 Functional Description

The wash station needs two valves for operation. The 4/2-way magnet valve VAD1 - driven with 24V - controls the draining of the wash station. In the absence of current it is closed.
Filling is controlled by the magnet valve 3-way B1/D2/D1, which is located on the valve block S/R system.

There are three functional states for the valves and pumps for the operation of wash station D1/D2:

Normal position:

- Waste Pump WP off
- Valve VWD1 on valve block S/R system off - closed
- Pinch Valve VAD1 in normal position 1 (level adjustment)
- Pump PWD off

Working position - Wash:

- Waste Pump WP on
- Valve VWD1 on valve block S/R system on - open
- Pinch Valve VAD1 in normal position 1 (level adjustment)
- Pump PWD on

Working position - Drain:

- Waste Pump WP on
- Valve VWD1 on - open
- Pinch Valve VAD1 in position 2/3 (magnet reversed, lower level)
- Pump PWD on

4.2.17.4 Tubings

The wash station has two inlets and three outlets.
For further information, please refer to Chapter 3 Fluidics

4.2.17.5 Service Procedures

Replaceable Components:

- Insert Wash Station D1/D2/S (215)
- Wash Station D1 (421)
- Y-Piece (217), included in Set 5, see Chapter 8
- Y-Piece (227), included in Set 5, see Chapter 8
- O-Ring (504), included in Set 2, see Chapter 8
- Pinch Tubing (544) (is also included in Set 2, see Chapter 8)

Dismounting the Wash Station:

- Disconnect the tubing.
- Loosen the screws (144).
- Remove Wash Station D1/D2 (421).
- ***NOTE: When remounting, the wash station will have to be readjusted, see Chapter 6 Software.***

Dismounting the Wash Station Insert:

The wash station insert is screwed in the wash station.

4.2.17.6 Wiring

NA

4.2.17.7 Additional Notes

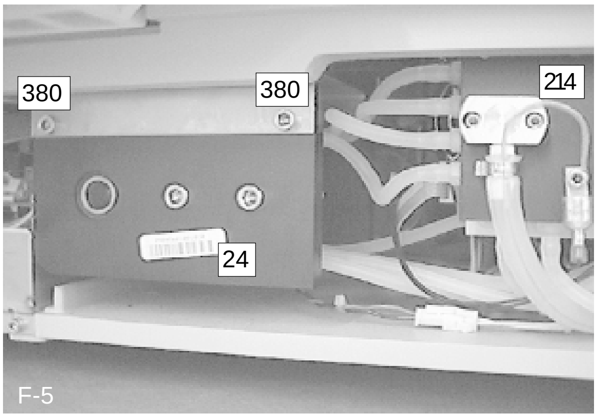
✎

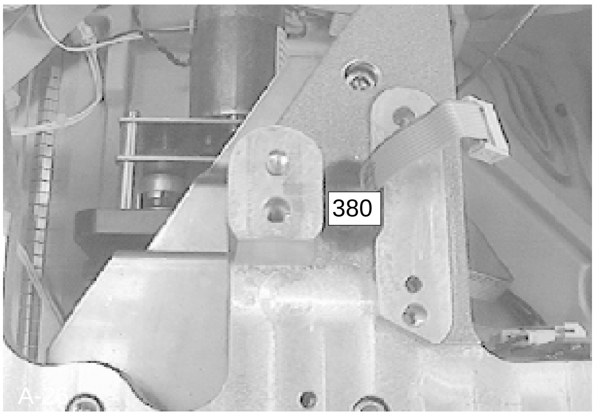
4.2.18 Waste Module

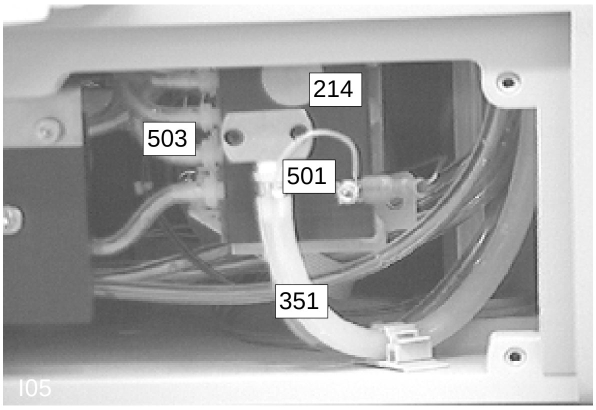
4.2.18.1 General Description

The waste module transfers waste to the waste bottle.

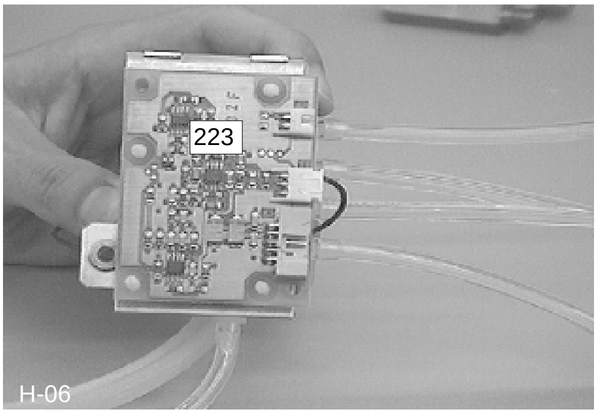
4.2.18.2 Location

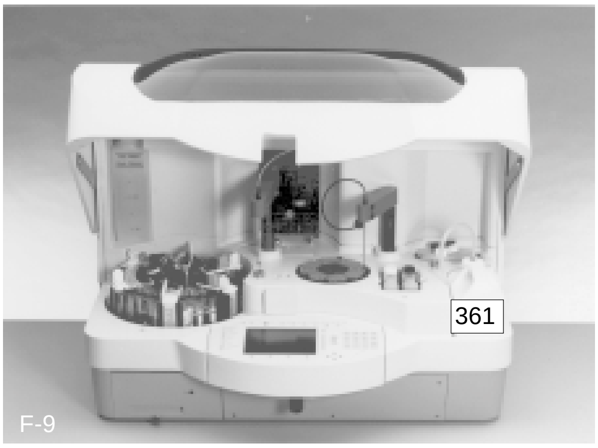

380
380
214
24
F-5




214
503
501
351
I05

24	Waste Pump
214	Waste/Water Distributor
223	PCB Waste Level
351	Tubing Waste
361	Bottle Waste
380	Screw
501	O-Ring Waste
503	Tubing for Waste Pump





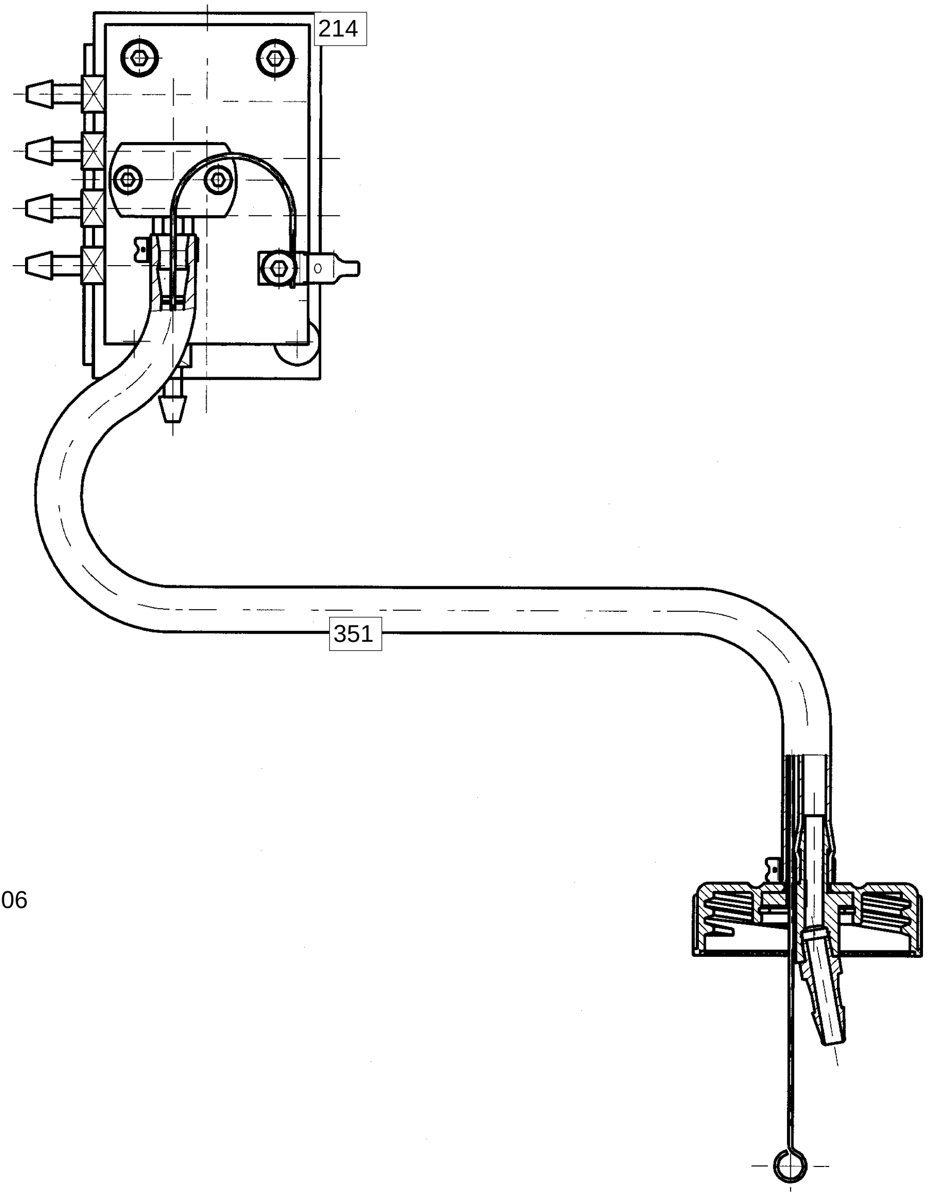
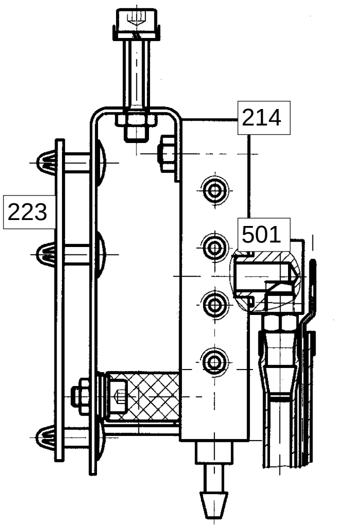


Fig. 2111-06



214	Waste/Water Distributor
223	PCB Waste Level
351	Tubing Waste
501	O-Ring Waste

4.2.18.3 Functional Description

The waste module consists of several components:
The waste pump is a 4-step peristaltic pump. It is driven by a 24V DC gear motor at a constant speed. An LLD sensor in the waste bottle responds at approximately 90% filling capacity.

The waste distributor collects the waste from the cell and the waste pump.

The peristaltic pump transfers the waste via the waste distributor to the waste bottle.

4.2.18.4 Tubings

Tubing connections:

VM1 to Waste/Water Distributor (214)
Wash Station D1 (421) to Waste/Water Distributor (214)
Wash Station D2 (421) to Waste/Water Distributor (214)
Wash Station B (219) to Waste/Water Distributor (214)
Wash Station S (216) to Waste/Water Distributor (214)
Waste/Water Distributor (214) to Waste Bottle (361)

For further information, please refer to Chapter 3 Fluidics.

4.2.18.5 Service Procedures

Replaceable Components:

- Waste Pump (24)
- Waste/Water Distributor (214)
- PCB Waste Level (223)
- Tubing Waste (351)
- Bottle Waste (361)
- O-Ring Waste (501), included in Set 2, see Chapter 8
- Tubing for Waste Pump (503), included in Set 2, see Chapter 8

Dismounting the Waste Pump:

- Disconnect the tubing.
- Loosen the screws (380).
- Pull the Waste Pump (24) out to the front.
- Disconnect the cables.

4.2.18.6 Wiring

Waste pump and distributor have several cable connections. For further information, please refer to Chapter 5 Electronics.

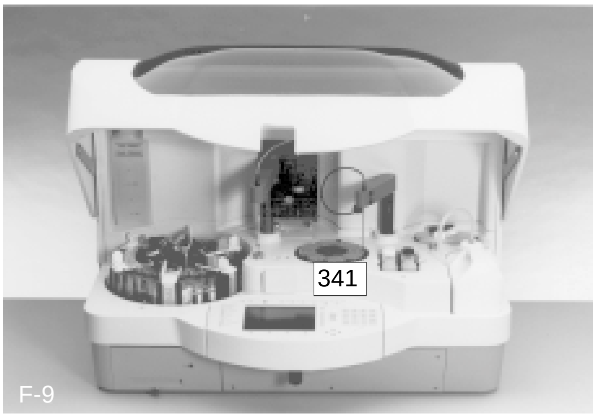
4.2.18.7 Additional Notes

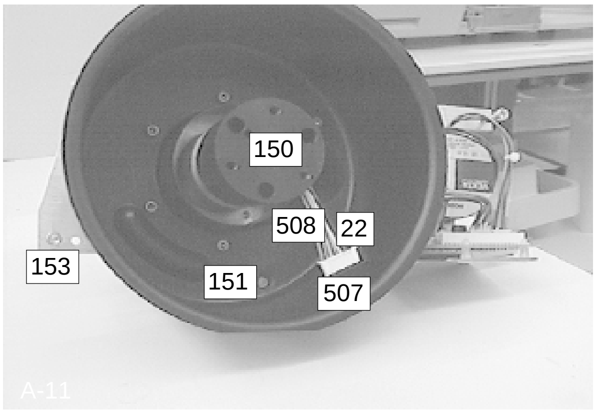
4.2.19 Incubator Drive

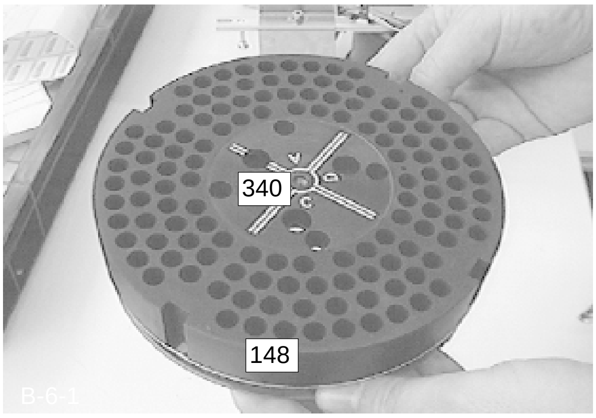
4.2.19.1 General Description

Elecsys 1010 has an incubator drive that ensures correct positioning of the vessels.

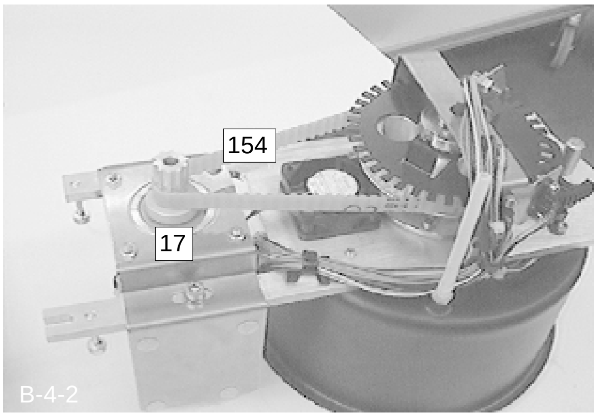
4.2.19.2 Location

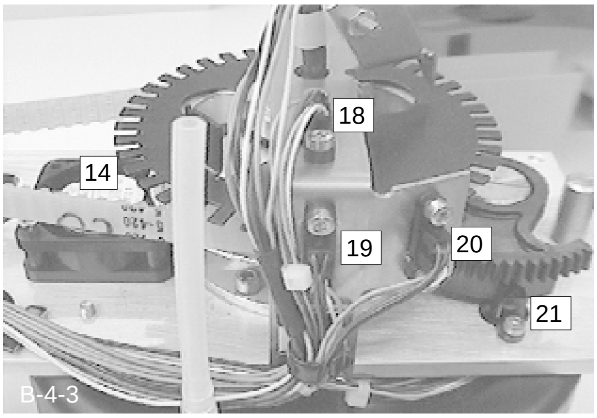


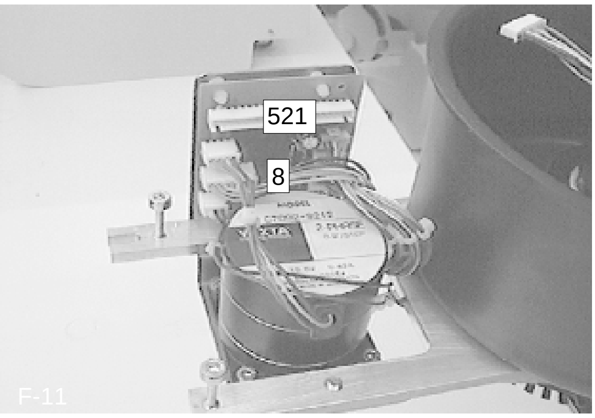

150
508
22
153
151
507
A-11



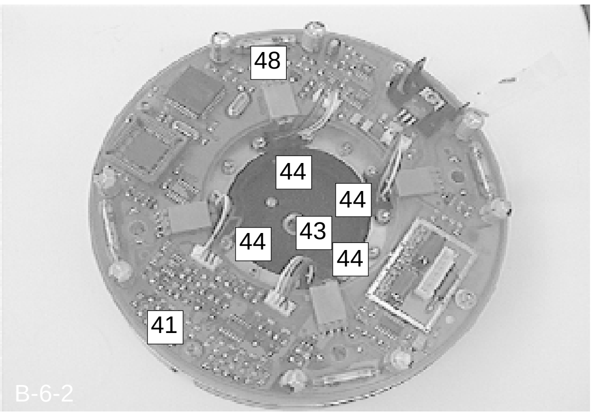
8	PCB Dist Rotor/Rotor
14	Fan Assy Incubator Drive
17	Stepping Motor Incubator Drive
18	Photo Coupler Incubator Drive
19	Photo Coupler Incubator Drive
20	Photo Coupler Incubator Drive
21	Photo Coupler Incubator Drive
22	Cable Incubator Heater




18
14
19
20
21
B-4-3



148	Incubation Rotor Assy
150	Plate
151	Drain Hole
153	Screw
154	Tooth Belt Incubator Drive
340	Screw
341	Incubator Drive
507	Plug
508	Cable Incubator Heater
521	Cable R2



41 PCB Incubator Heater B6
43 Heater Resistors
44 Photo Coupler Incubator Segment
48 Sensor (NTC)

4.2.19.3 Functional Description

The incubator is an aluminum block that is heated to 37°C ±0.3°C. It holds the incubation vessels.
The S/R rotor and the incubation rotor are different. The difference is that a cable is conducted through the center of the incubation rotor. As a result, the rotation angle of the incubation rotor is limited by a mechanical stop. The incubation rotor is firmly screwed to the drive.

4.2.19.4 Tubings

The tray has an outlet with short tubing that leads to the base of the analyzer.

4.2.19.5 Service Procedures

Replaceable Components:

- Stepping Motor Incubator Drive (17)
- Fan Assy Electr. Rack/Incubator (14)
- Tooth Belt Incubator Drive (154)
- Photo Coupler Incubator Drive (18)
- Photo Coupler Incubator Drive (19)
- Photo Coupler Incubator Drive (20)
- Photo Coupler Incubator Drive (21)
- Photo Coupler Incubator Segment (44)
- Incubation Rotor Assy (148)
- PCB Dist Rotor/Rotor (8)
- Cable R2 (521)

- Cable Incubator Heater (22) consisting of:
  - Plug (507)
  - Cable Incubator Heater (508)

Dismounting the Incubator Drive:

- Disconnect the cables.
- Loosen the screws (153).
- Remove the Incubator Drive (341) upward.
- ***NOTE: Do not place the dismounted incubator drive on the photo couplers - Risk of damage!***
- ***NOTE: When remounting, the incubator drive will have to be readjusted, see Chapter 6 Software..***

Removal and replacement of the Incubator Heater Cable:

Cable Incubator Heater (508) and Plug (507) are delivered as separate components.

- Cut the Cable Incubator Heater (22).
- Remove the Plate (150).
- Pull the new Cable Incubator Heater (508) through the shaft from the top to the bottom.
- Assemble the Cable Incubator Heater and Plug (507).

Dismounting the Incubation Rotor Assy:

- Loosen the screws (340).
- Disconnect the cables.
- Remove the Incubation Rotor Assy (148).
- ***NOTE: When remounting, the incubation rotor assy needs to be readjusted, see Chapter 6 Software.***

4.3.19.6 Wiring

see Chapter 5 Electronics.

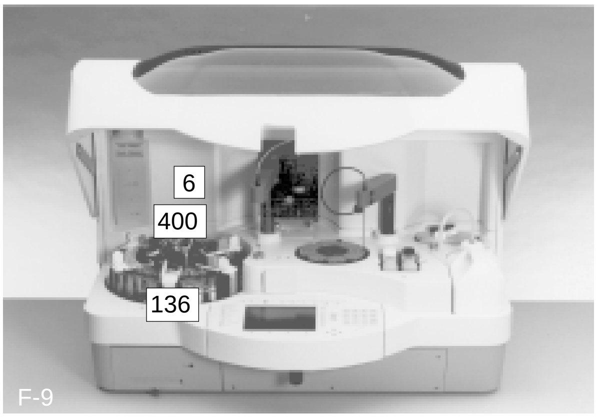
4.3.19.7 Additional Notes

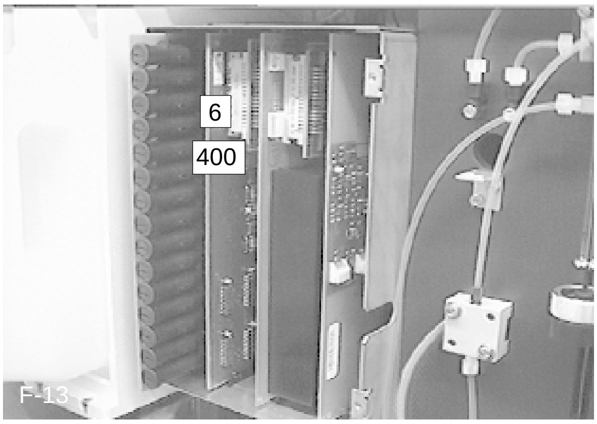
4.2.20 S/R Rotor Drive

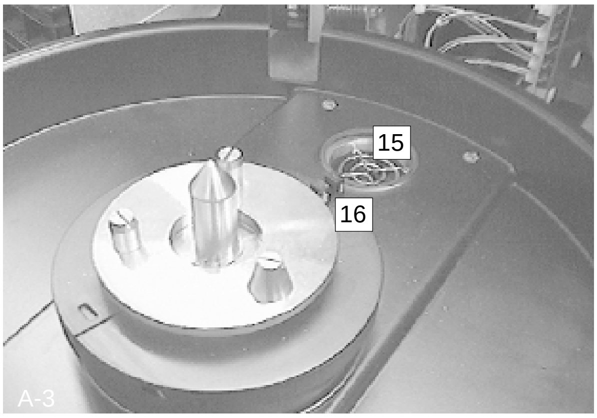
4.2.20.1 General Description

Elecsys 1010 incorporates a sample/reagent rotor drive that ensures the correct positioning of the samples, reagents and beads.

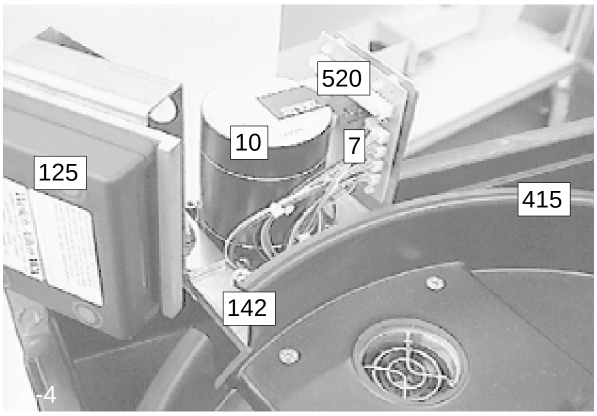
4.2.20.2 Location

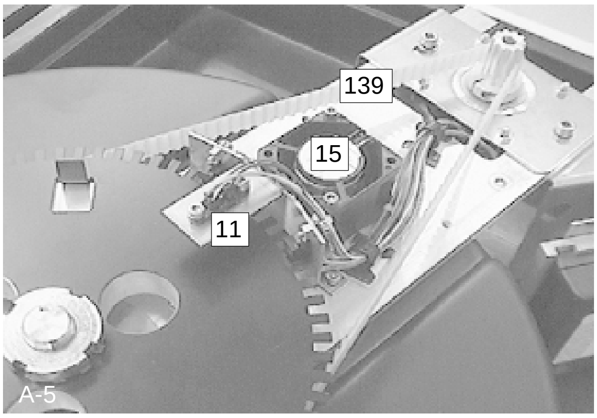


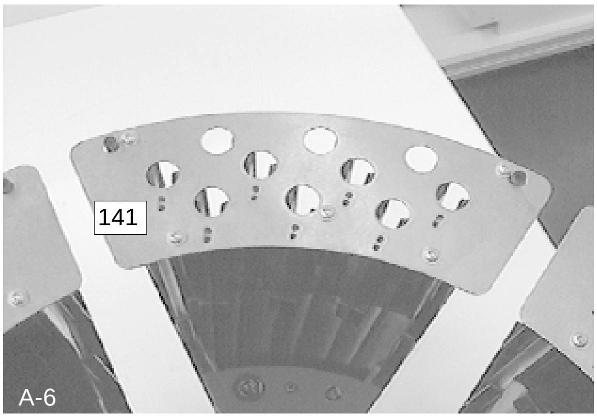




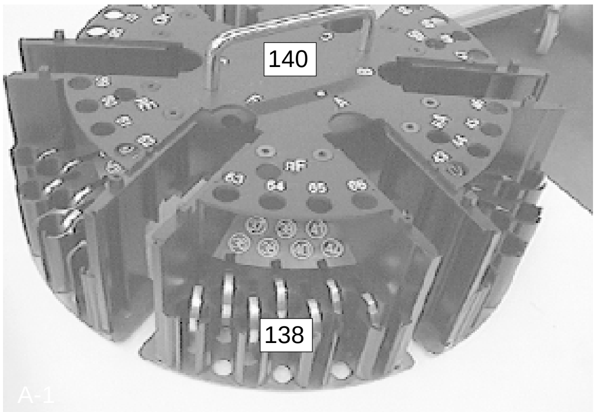
6	PCB Rotor/Rotor Module B4
7	PCB Dist Rotor/Rotor
10	Stepping Motor S/R Drive
11	Photo Coupler S/R Drive
15	Fan Assy S/R Drive
16	Photo Coupler S/R Tray
125	BCR

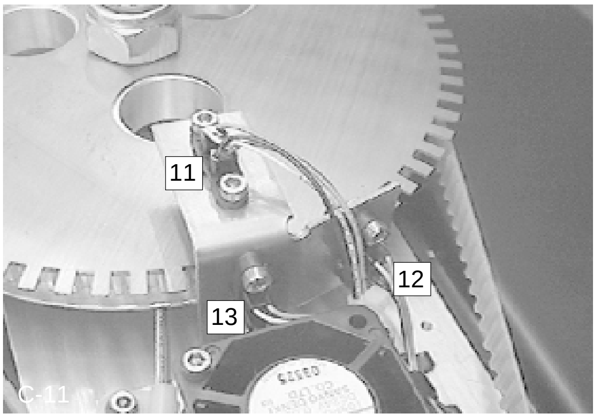

520
10
7
125
415
142
A-4





136	S/R Rotor Drive
141	Retaining Plate
142	Screw
139	Tooth Belt S/R Drive
400	PCB Controller, located on B4
415	Plastic Housing S/R Rotor
520	Cable R1





11	Photo Coupler S/R Drive
12	Photo Coupler S/R Drive
13	Photo Coupler S/R Drive
138	Spring S/R Drive
140	S/R Rotor Assy

4.2.20.3 Functional Description

The S/R rotor assy holds the primary tubes, secondary cups, rack packs, calibrators and controls.

The primary tubes are placed in the outer rings of the S/R rotor assy and are held in place by the Springs S/R Drive (138). The primary tubes are labeled and may read by a bar code reader. The rack packs are arranged radially between the sample segments. They are also provided with bar code labels on the outside and have to be read by the bar code reader prior to a run.

An integrated fan takes air in from outside to ensure the rotor insert is always exposed to fresh air.

The tray has no drain outlet and should be cleaned with common detergents. The rotor insert is dishwasher-proof.

4.2.20.4 Tubings

NA

4.2.20.5 Service Procedures

Replaceable Components:

- PCB Rotor/Rotor Module B4 (6)
- PCB Dist Rotor/Rotor (7)
- Stepping Motor S/R Drive (10)
- Photo Coupler S/R Drive (11)
- Photo Coupler S/R Drive (12)
- Photo Coupler S/R Drive (13)
- Fan Assy S/R Drive (15)
- Photo Coupler S/R Tray (16)
- BCR (125)
- Spring S/R Drive (138)
- Tooth Belt S/R Drive (139)
- S/R Rotor Assy (140)
- PCB Controller (400), located on B4
- Plastic Housing S/R Rotor (415)
- Cable R1 (520)

Dismounting the S/R Rotor Drive:

- Remove the S/R Rotor Assy (140).
- Loosen the screws (142).
- Disconnect the cables.
- Remove the S/R Rotor Drive (136) by lifting it upward.
- ***NOTE: Do not place the dismounted incubator drive on the photo couplers - Risk of damage!***
- ***NOTE: When remounting, the S/R rotor drive needs to be readjusted, see Chapter 6 Software.***

The adjustment of the BCR (125) is maintained. Readjust the tooth belt tension of the Stepping Motor S/R Drive (10) after replacement.

Dismounting the Bar Code Reader:

When replacing the BCR (125), ensure it is closely located at the limit stops.

After replacement, the BCR needs to be readjusted. For the readjustment procedure, please refer to Chapter 6.2.

Dismounting the S/R Drive Spring:

To replace the Spring S/R Drive (138) unscrew the Retaining Plate (141).

NOTE! When remounting, make sure that the spring is correctly fitted. The spring should be elastic.

4.2.20.6 Wiring

see Chapter 5 Electronics.

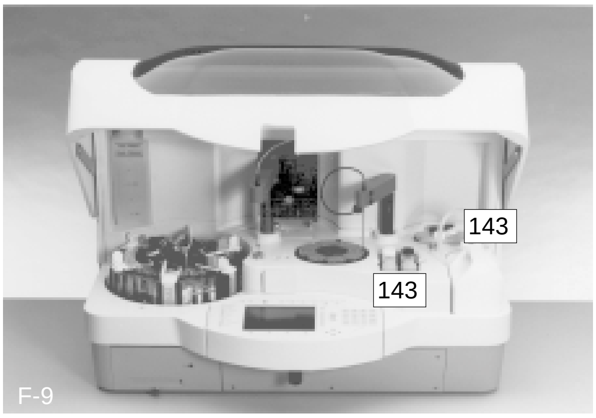
4.2.20.7 Additional Notes

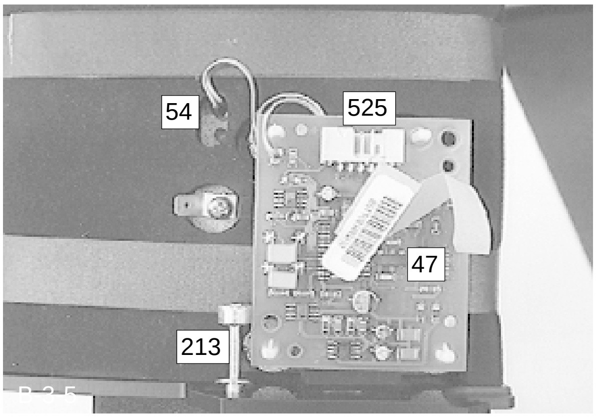
4.2.21 Bottle Temperature Assy

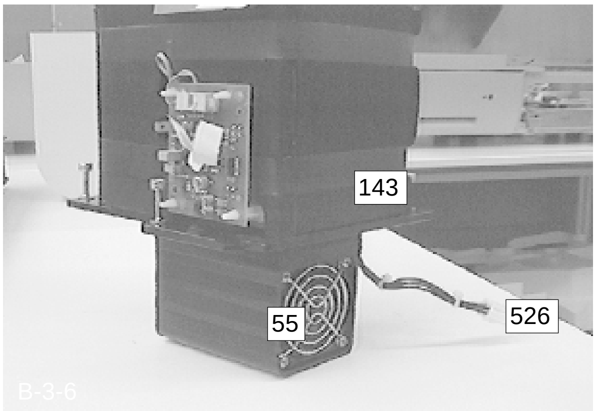
4.2.21.1 General Description

Elecsys 1010 incorporates 2 identical bottle temperature assemblies. They contain the cell cleaner and assay buffer bottles, which can be identified easily due to their shape.

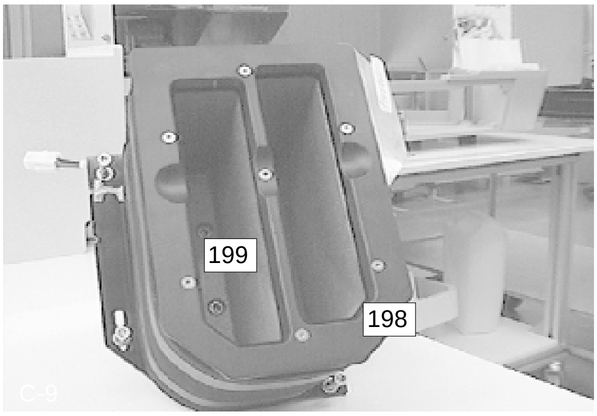
4.2.22.2 Location







47	PCB Preamp Temperature
54	Sensor
55	Peltier Assy Bottle Temp
143	Bottle Temperature Assy
198	Top Plate Bottle Temp
199	Bottle Housing
213	Screw



525	Cable T1
526	Cable T2

4.2.21.3 Functional Description

The bottle temperature is attained by use of a Peltier element of approximately 22W. After approximately 1 hour, the bottles, that have a temperature of 8^{O}C when taken from the refrigerator, reach the set temperature of 28^{O}C. It is necessary that the temperature is exactly maintained as the cell is flushed with comparatively large amounts of assay buffer which also have a thermal effect on the preheating. The comparatively large amounts of cell cleaner, that flow through the system between two detection cycles, have a similar effect. An NTC resistor at the side wall of the housing detects the actual temperature, which is processed and digitized in the temperature preamplifiers.

4.2.21.4 Tubings

NA

4.2.21.5 Service Procedures

Replaceable Components:

- PCB Preamp Temperature (47)
- Bottle Housing (199)
- Peltier Assy Bottle Temp (55)
- Bottle Temperature Assy (143)
- Top Plate Bottle Temp (198)
- Adhesive (3), not depicted, included in Set 4, see Chapter 8
- Hardener (5), not depicted, included in Set 4, see Chapter 8
- Cable T1 (525)
- Cable T2 (526)

Dismounting the Bottle Temperature Assy:

- Loosen the screws (213).
- Disconnect the cables.
- Remove the Bottle Temperature Assy (143) by lifting it upward.

- ***NOTE: When remounting, the bottle temperature assy will have to be readjusted, see Chapter 6 Software.***
- ***NOTE: When remounting, ensure that the cable connection is directed towards the MFA Sipper (flow direction of the cooling air).***
- ***NOTE: When replacing the Peltier element (55), apply some heat conduction paste (see Chapter 8 Spare Parts) between the aluminum housing, bottle temperature assy and the Peltier element .***

Dismounting the PCB Preamp Temperature and Sensor:

The Sensor (54) is fixed with adhesive and cannot be removed. If the sensor is defective, the replacement part has to be fitted in the second hole and fixed with adhesive. For the adhesive for fixing the temperature sensor, please refer to Chapter 8 Spare Parts.
New holes have to be drilled if required. Always replace the sensor together with the PCB Preamp Temperature (47), as the trimming values are stored on the PCB.
Hardening at room temperature will take approximately 15 hours. Therefore, fixing with adhesive tape is required.

4.2.21.6 Wiring

The bottle temperature assy has three cable connections. For further information, please refer to Chapter 5 Electronics.

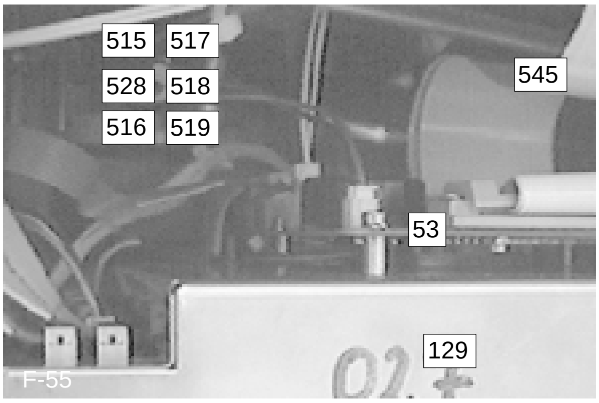
4.2.21.7 Additional Notes

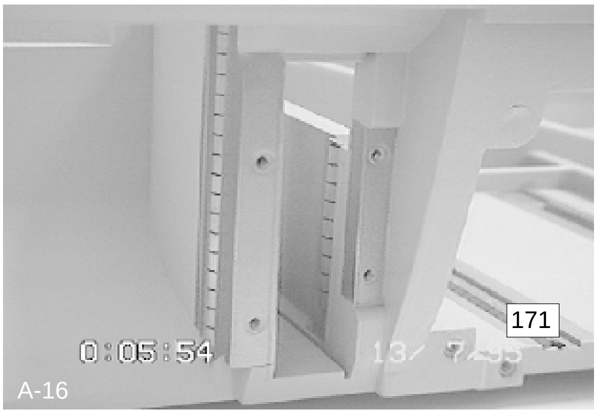
4.2.22 OEM Master

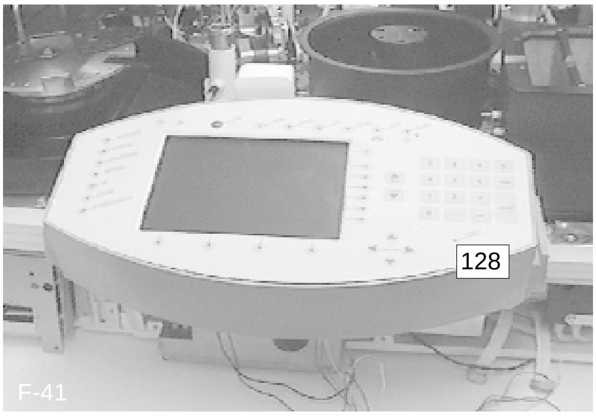
4.2.22.1 General Description

see Chapter 5.3.11 OEM Master

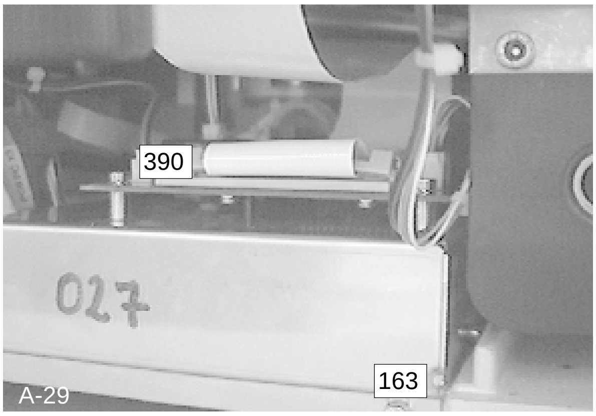
4.2.22.2 Location







53	PCB Dist Keyboard
128	Keyboard Assy
129	OEM Master
163	Screw
171	Grounding Contact Set
390	Strain Relief
515	Cable PC10, behind OEM Master
516	Cable PC2, behind OEM Master
517	Cable PC8, behind OEM Master
518	Cable PC6, behind OEM Master
519	Cable PC3, behind OEM Master



528	Cable PC1, behind OEM Master
545	Flat Cable set keyb. OEM Master

4.2.22.3 Functional Description

see Chapter 5.3.11 OEM Master

4.2.22.4 Tubings

NA

4.2.22.5 Service Procedures

Replaceable Components:

- PCB Dist Keyboard (53)
- OEM Master (129)
- Grounding Contact Set (171)
- Cable PC1 (528)
- Cable PC10 (515)
- Cable PC2 (516)
- Cable PC8 (517)
- Cable PC6 (518)
- Cable PC3 (519)
- Flat Cable set keyb. OEM Master (545)

Dismounting the OEM Master:

- Loosen the screws (163).
- Pull the OEM Master (129) out to the front.
- Unscrew the Strain Relief (390).
- Disconnect the connecting cables of the OEM Master and the PCB from the PCB.
- Separate the rear cable connections.
- ***NOTE: When reconnecting the cables to the Keyboard Assy (128), the blue ends of the cables should point downward.***
  First cable is ground.
  Second cable is voltage supply and data line.
- ***NOTE: When remounting, make sure not to bend the Grounding Contact Set (171).***
- ***NOTE: When replacing the OEM Master (129) please check for correct jumper setting (Chapter 5.4.1) and setup (Chapter 6.4)***

4.2.22.6 Wiring

see Chapter 5 Electronics.

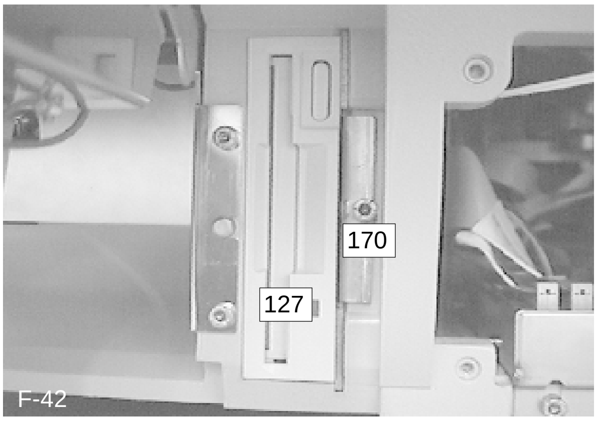
4.2.21.7 Additional Notes

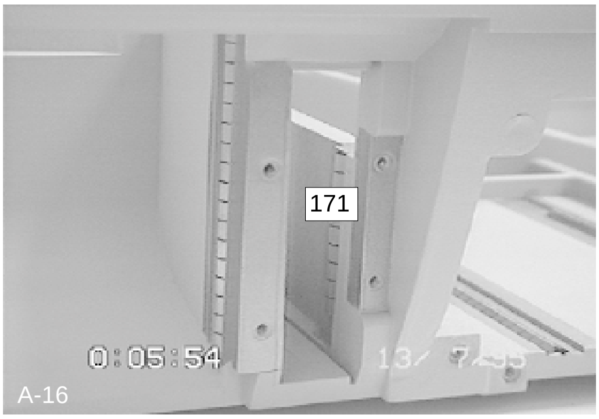
4.2.23 Floppy Drive

4.2.23.1 General Description

see Chapter 5.3.11 OEM Master

4.2.23.2 Location





127	Floppy Drive
170	Screw
171	Grounding Contact Set

4.2.23.3 Functional Description

see Chapter 5.3.11 OEM Master

4.2.23.4 Tubings

NA

4.2.23.5 Service Procedures

Replaceable Components:

- Floppy Drive (127)
- Grounding Contact Set (171)

Dismounting the Floppy Drive:

- Loosen the screws (170).
- Pull the Floppy Drive (127) out to the front.
- Undo the cable connection behind the Floppy Drive.
- ***NOTE: When remounting the Floppy Drive, make sure not to bend the Grounding Contact Set (171).***

4.2.23.6 Wiring

see Chapter 5 Electronics.

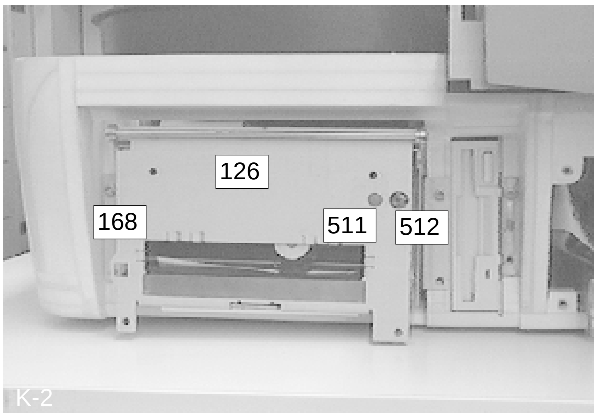
4.2.23.7 Additional Notes

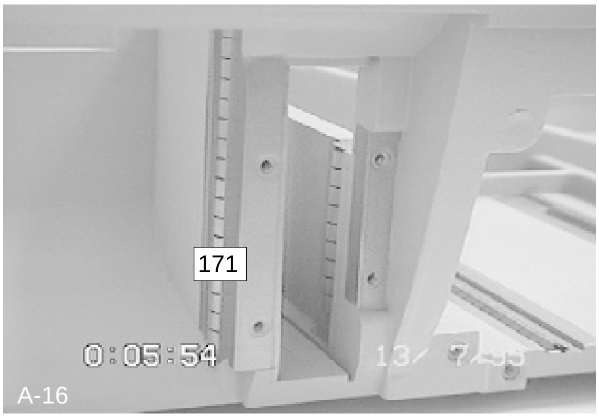
4.2.24 Printer

4.2.24.1 General Description

see Chapter 5.3.11

4.2.24.2 Location





126 Printer
168 Screw
171 Grounding Contact Set
511 Diffusion Disk
512 Key Button

4.2.24.3 Functional Description

see Chapter 5.3.11

4.2.24.4 Tubings

NA

4.2.24.5 Service Procedures

Replaceable Components:

- Plate Printer (166), consisting of:
  - Diffusion Disk (511)
  - Key Button (512)
- Printer (126)
- Grounding Contact Set (171)

Dismounting the Printer:

Preparatory Work:

- Dismount the S/R Rotor Drive, see 4.2.20.

Servicing the Printer:

- Separate the cable connections behind the printer.
- Loosen the screws (168).
- Pull the Printer (126) out to the front.
- ***NOTE: When remounting the printer, make sure not to bend the Grounding Contact Set (171).***

4.2.24.6 Wiring

see Chapter 5 Electronics

4.2.24.7 Additional Notes

5 Electronics

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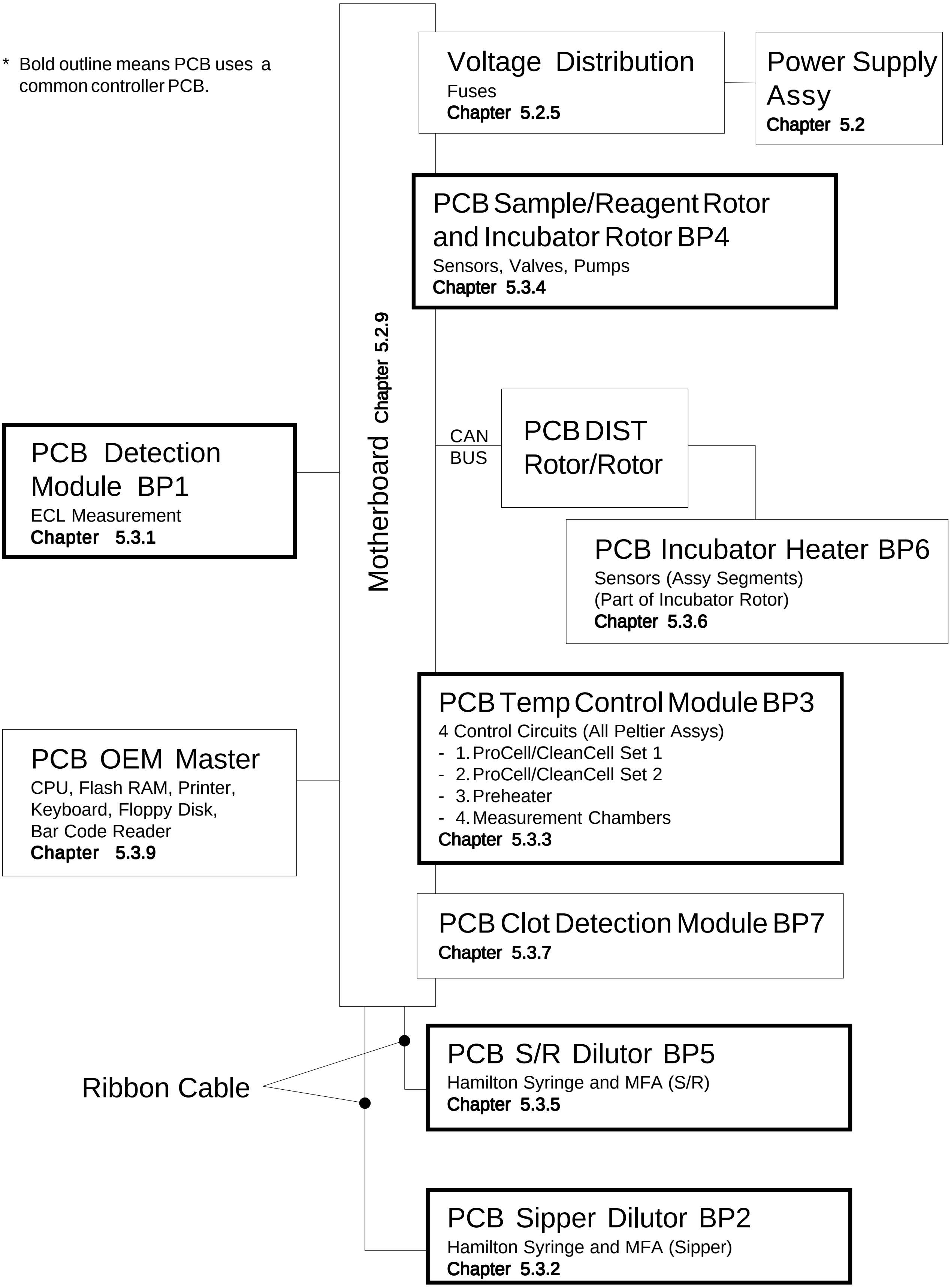
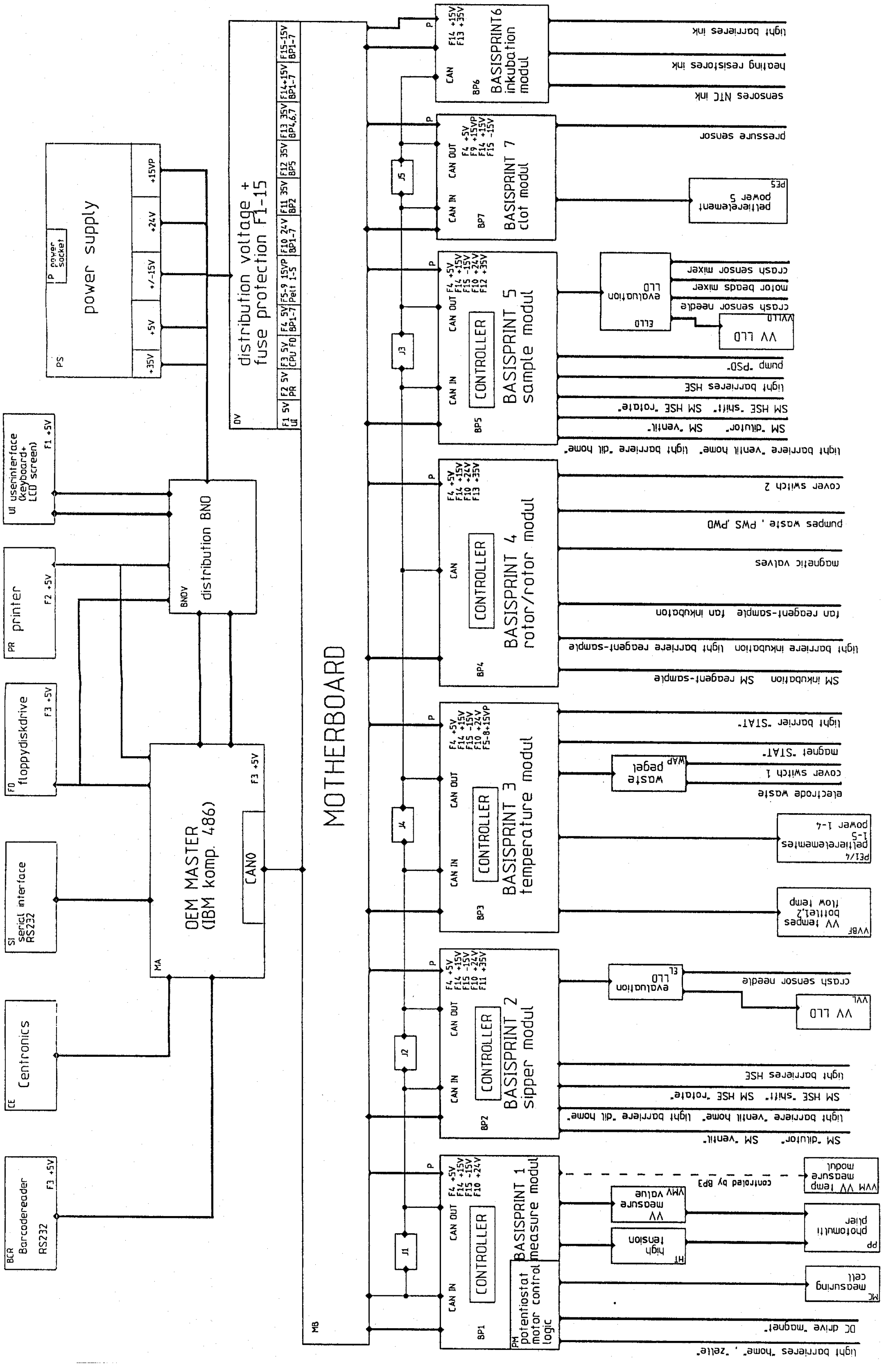
5.1 Electronic System Overview

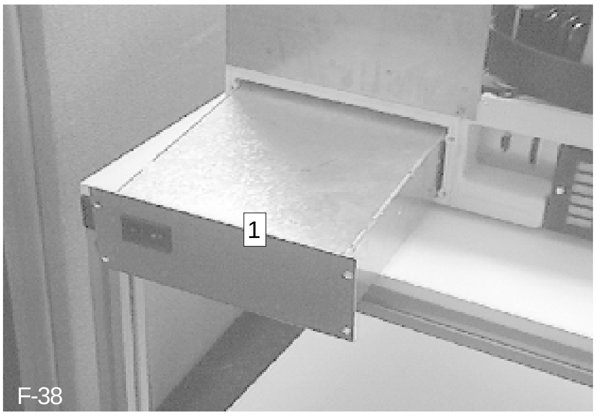

Voltage Distribution
Fuses
Chapter 5.2.5
Power Supply Assy
Chapter 5.2
PCB Sample/Reagent Rotor and Incubator Rotor BP4
Sensors, Valves, Pumps
Chapter 5.3.4
Motherboard Chapter 5.2.9
CAN BUS
PCB DIST Rotor/Rotor
PCB Detection Module BP1
ECL Measurement
Chapter 5.3.1
PCB Incubator Heater BP6
Sensors (Assy Segments)
(Part of Incubator Rotor)
Chapter 5.3.6
PCB Temp Control Module BP3
4 Control Circuits (All Peltier Assys)
- 1. ProCell/CleanCell Set 1
- 2. ProCell/CleanCell Set 2
- 3. Preheater
- 4. Measurement Chambers
Chapter 5.3.3
PCB OEM Master
CPU, Flash RAM, Printer, Keyboard, Floppy Disk, Bar Code Reader
Chapter 5.3.9
PCB Clot Detection Module BP7
Chapter 5.3.7
Ribbon Cable
PCB S/R Dilutor BP5
Hamilton Syringe and MFA (S/R)
Chapter 5.3.5
PCB Sipper Dilutor BP2
Hamilton Syringe and MFA (Sipper)
Chapter 5.3.2

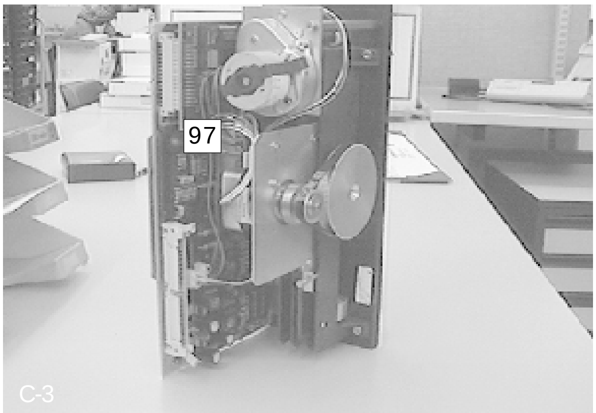
* Bold outline means PCB uses a common controller PCB.

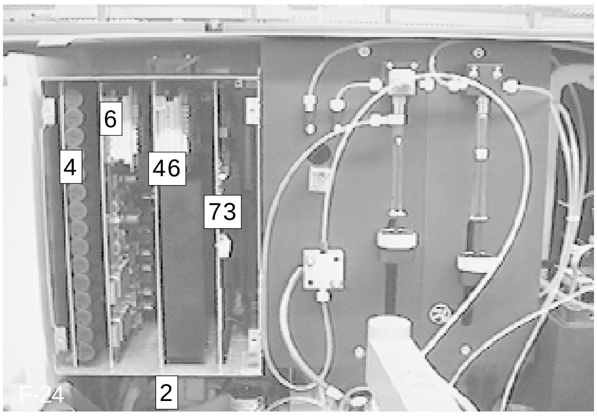
5.1.1 General Plan

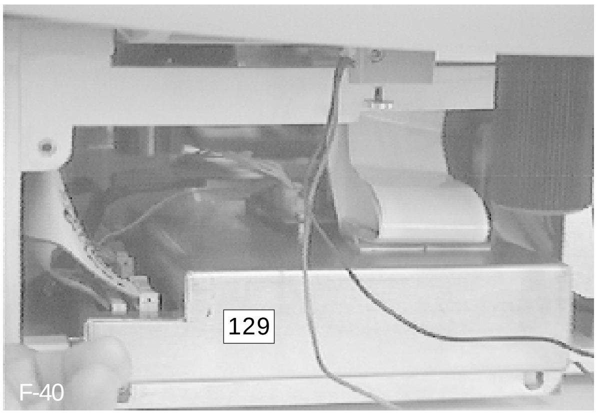

power supply
P power socket
PS
+15VP
+24V
+/-15V
+5V
+35V
distribution voltage + fuse protection F1-15
DV
F1 5V UI
F2 5V PR
F3 5V CPU FD
F4 5V BP1-7
F5-9 15VP Pelt 1-5
F10 24V BP1-7
F11 35V BP2
F12 35V BP5
F13 35V BP4,6,7
F14 +15V BP1-7
F15 -15V BP1-7
UI userinterface (keyboard+ LCD screen) F1 +5V
PR printer F2 +5V
FD floppydiskdrive F3 +5V
SI serial interface RS232
CE Centronics
BCR Barcodereader RS232 F3 +5V
BNOV distribution BNO
MA OEM MASTER (IBM komp. 486)
CAN0
F3 +5V
MOTHERBOARD
MB
J1
J2
J3
J4
J5
P
CAN
CAN IN
CAN OUT
CONTROLLER
BP6 BASISPRINT6 inkubation modul
F14 +15V F13 +35V
light barriers ink
heating resistores ink
sensores NTC ink
BP7 BASISPRINT 7 clot modul
F4 +5V F9 +15VP F14 +15V F15 -15V
pressure sensor
PE5 peltierelement power 5
BP5 BASISPRINT 5 sample modul
F4 +5V F14 +15V F15 -15V F12 +35V
ELLD evaluation LLD
crash sensor mixer
motor beads mixer
crash sensor needle
VVLLD VV LLD
pump "PSD"
light barriers HSE
SM HSE "shift" SM HSE "rotate"
SM "dilutor" SM "ventil"
light barriere "ventil home" light barriere "dil home"
BP4 BASISPRINT 4 rotor/rotor modul
F4 +5V F14 +15V F10 +24V F13 +35V
cover switch 2
pumpes waste, PWS, PWO
magnetic valves
fan reagent-sample fan inkubation
light barriere inkubation light barriere reagent-sample
SM inkubation SM reagent-sample
BP3 BASISPRINT 3 temperature modul
F4 +5V F14 +15V F10 +24V F5-8 +15VP
light barrier "STAT"
magnet "STAT"
WAP waste pegel
cover switch 1
electrode waste
PE1/4 peltierelementes 1-5 power 1-4
VVBF VV tempes bottle1,2 flow temp
BP2 BASISPRINT 2 sipper modul
F4 +5V F14 +15V F15 -15V F11 +35V
EL evaluation LLD
crash sensor needle
VVL VV LLD
light barriers HSE
SM HSE "shift" SM HSE "rotate"
light barriere "ventil home" light barriere "dil home"
SM "dilutor" SM "ventil"
BP1 BASISPRINT 1 measure modul
F4 +5V F14 +15V F15 -15V F10 +24V
PM potentiostat motor control logic
controled by BP3
VVM VV temp measure modul
VMV VV measure value
PP photomultiplier
HT high tension
MC measuring cell
DC drive "magnet"
light barrieres "home", "zelle"

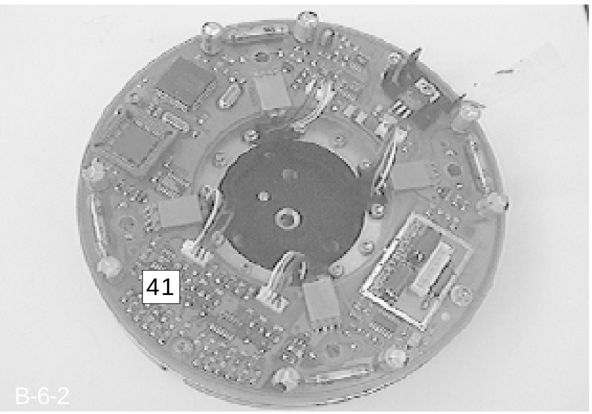
5.1.2 Location

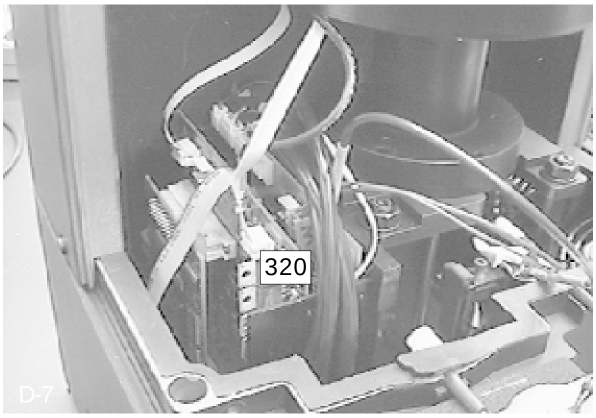


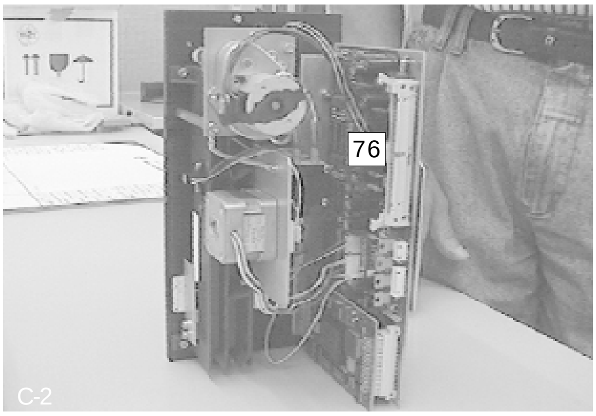



6
4
46
73
F-24
2









1	Power Supply Assy
2	PCB Motherboard (not visible, behind PCB- Boards)
4	PCB Dist Voltage
6	PCB Rotor/Rotor Module BP4
41	PCB Incubator Heater BP6
46	PCB Temp Module BP3
73	PCB Clot Detection Module BP7
76	PCB Dilutor Reagent BP5
97	PCB Dilutor Sample BP2
129	PCB OEM Master
320	PCB Detection Module BP1

5.1.3 Operating principle of the New LLD

Based on the previously gained knowledge, the new LLD design uses a more intelligent signal evaluation concept - virtually, a two-dimensional evaluation of the LLD signal.
The LLD is activated during the descent of the MFA. From that moment, the real, analog measured values are stored by the module firmware. Once the needle contacts the fluid surface, a change in the measured value occurs, which varies depending on the boundary conditions. of sample/reagent vessels.
The first evaluation step (so-called trigger) is a software-mathematical processing of such a change in measured value. The signal resulting from this is compared with a (software) adjustable set value (slope parameter gt). When the set value is exceeded, the actual measured value and a previous defined measured value are retained and the second evaluation step begins.
The second evaluation step (so-called threshold monitoring) checks the signal level. Unlike the previous LLD, the new LLD uses the stored signal value (just before the needle contacts the fluid surface) as an initial value, which is compared with a second (software) adjustable set value (threshold parameter gl).
If the conditions of the two evaluation steps are fulfilled, the module firmware signals LLD.
In this dynamic examination of the measured values, the intrinsic attenuation (so-called Schleich) as a result of parasitic effects is irrelevant. Soft-/firmware adjustable parameters for slope and threshold allow the LLD function to be tuned specifically to the boundary conditions, i.e. that each vessel type in various positions obtains its own optimized parameters.

Principle of Evaluation of the LLD Signal

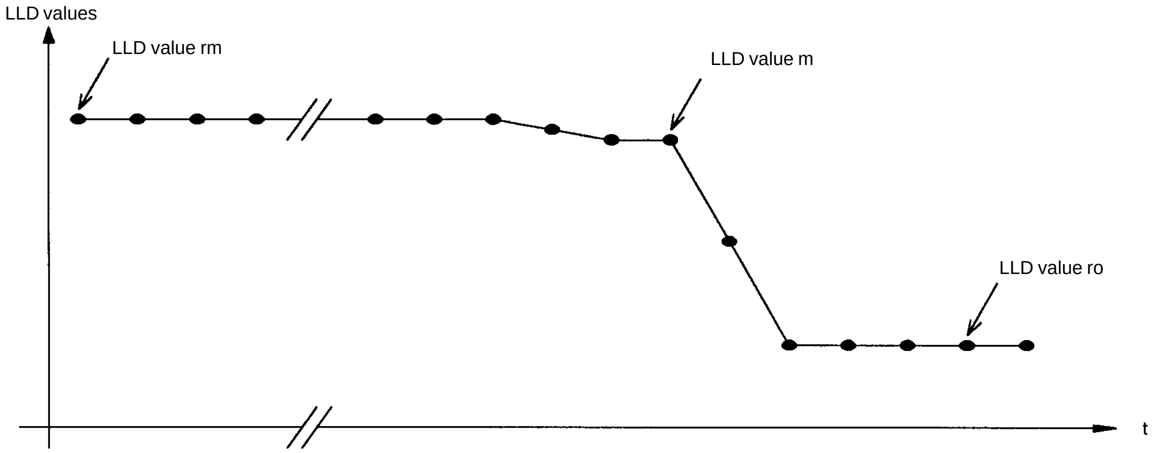


Fig. 5-1d

LLD Detection Threshold Values

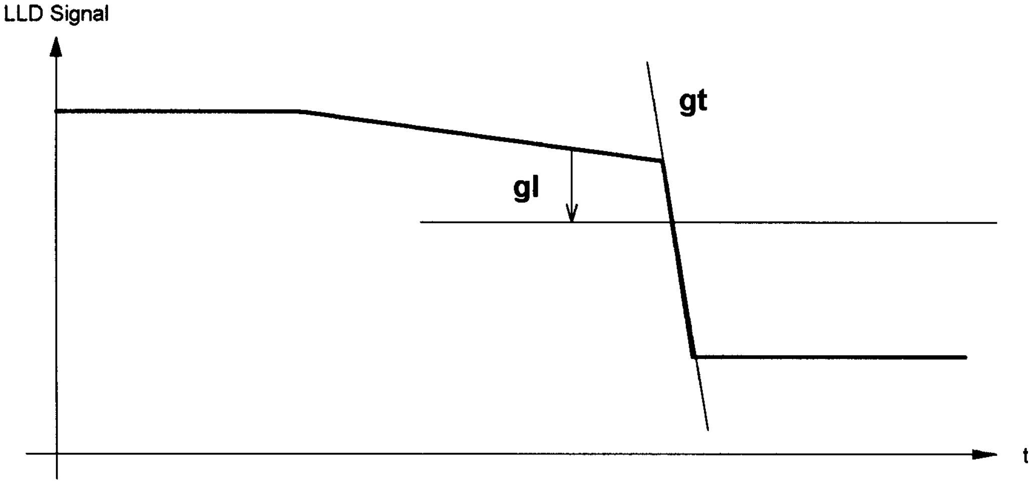


Fig. 5-1e

gl: Offset to LLD signal before the slope to set the threshold, below which the LLD signal has to be measured several times to attain the Liquid Level Detected state.

gt: Threshold of the rise of the LLD signal, which applies as the first trigger condition.

5.1.4 Clot detection and clot removal procedures

Clot detection

Elecsys 1010 pipettes sample material with the S/R needle. It may occur that certain samples cause a clot in the needle. The instrument is capable of detecting such clots. Clot detection is carried out by means of a pressure sensor which compares the negative pressure generated during sample pipetting against defined threshold values. The pipetting of samples on the S/R side of the instrument can be divided into 5 steps. The figure shows the development of the negative pressure during normal sample uptake without clot formation in the needle.

Clot removal

The normal course of pipetting on the S/R side is interrupted and special procedures are initiated to remove the clot detection on the S/R side.
On the sipper side everything continues as normal.

Exclusion of samples

The sample that caused clotting is excluded from further processing. When clotting occurs, the error handling, i.e. clot removal, will take the time of two measuring cycles. The samples that would have been processed during this period of time are excluded from any further processing.

S/R needle rinse

The S/R arm withdraws from the sample and travels to wash station 1, where the S/R needle is rinsed with fresh water. The wash station is drained after this.

Clot removal

The instrument attempts to remove the clot in the needle. The dilutor expels the entire fluid (sample/reagent) very slowly and travels to the 0 position.
If the overpressure generated during a dilutor travel as a result of a failure to remove a clot exceeds a defined level, the dilutor is switched off immediately (emergency stop) and an error message is displayed.

S/R needle rinse

The S/R needle is rinsed. After rinsing, the needle travels upward and wash station 1 is drained to remove any sample material that might be present. After that, the wash station is refilled with fresh water.

Check for successful clot removal

The S/R needle is lowered into wash station 1, and the clot detection procedure (see clot detection) is repeated by filling with fresh water from the wash station instead of sample. It is checked if the clot is still present during or after the water uptake. If the defined negative pressure limits were exceeded during pressure measuring, processing is aborted and error messages are displayed.

S/R needle rinse

If, during the check for successful clot removal, the defined negative pressure limits were not exceeded, the S/R needle is rinsed again, and processing is continued.

Note:
To protect the pressure sensor once an overpressure limit is exceeded in the S/R system in any instrument status, the S/R dilutor is switched off (emergency stop) and an error message is displayed.

A defective pressure sensor will abort processing in any instrument status and an error message will be displayed. The detection of a defective sensor has priority over an emergency stop.

Individual steps of a clot detection procedure

A. Recording of the initial pressure after immersion of the pipetting needle in the sample fluid.

B. Start of a negative pressure measurement, followed by start of pipetting with the dilutor.

C. Continuous pressure measurements.

D. End of the negative pressure measurements immediately after the dilutor was stopped. Between step D and E, waiting for the decay time of the negative pressure.

E. Check if a clot occurred during or after a sample uptake. If the defined negative pressure limits were not exceeded during the pressure measuring, the instrument will continue processing. If the defined negative pressure limits were exceeded during the measurement, the clot removal procedure will be initiated (see clot removal) and error messages will be displayed.

The initial pressure pa is the reference point for the following pressures:

pb = Threshold value 1 for clot detection
pg = Threshold value 2 for clot detection at the end of a measuring cycle
pn = Measured pressure during a measuring cycle
pe = Measured pressure at the end of a measuring cycle

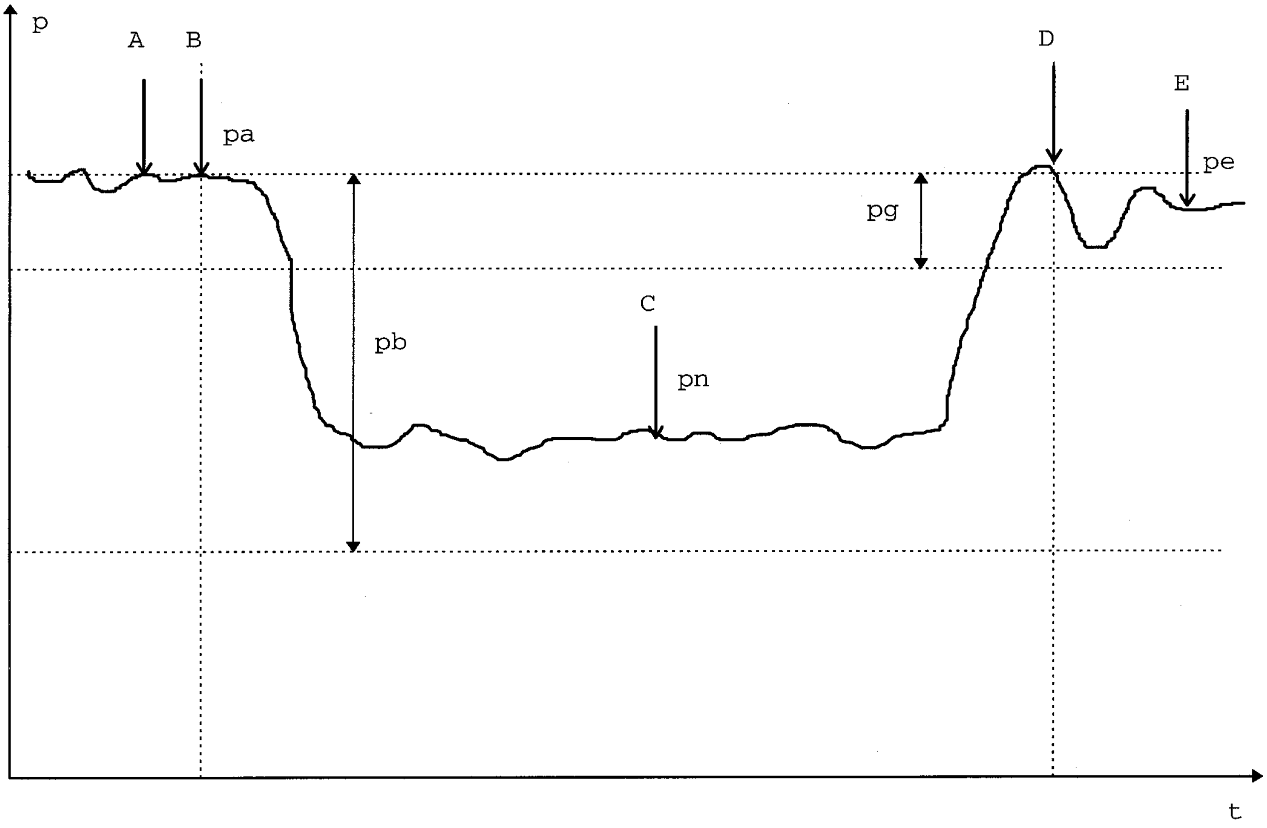


Fig. 5-1a

5.1.5 Measurement cycle with clot detection at the start of a measurement cycle

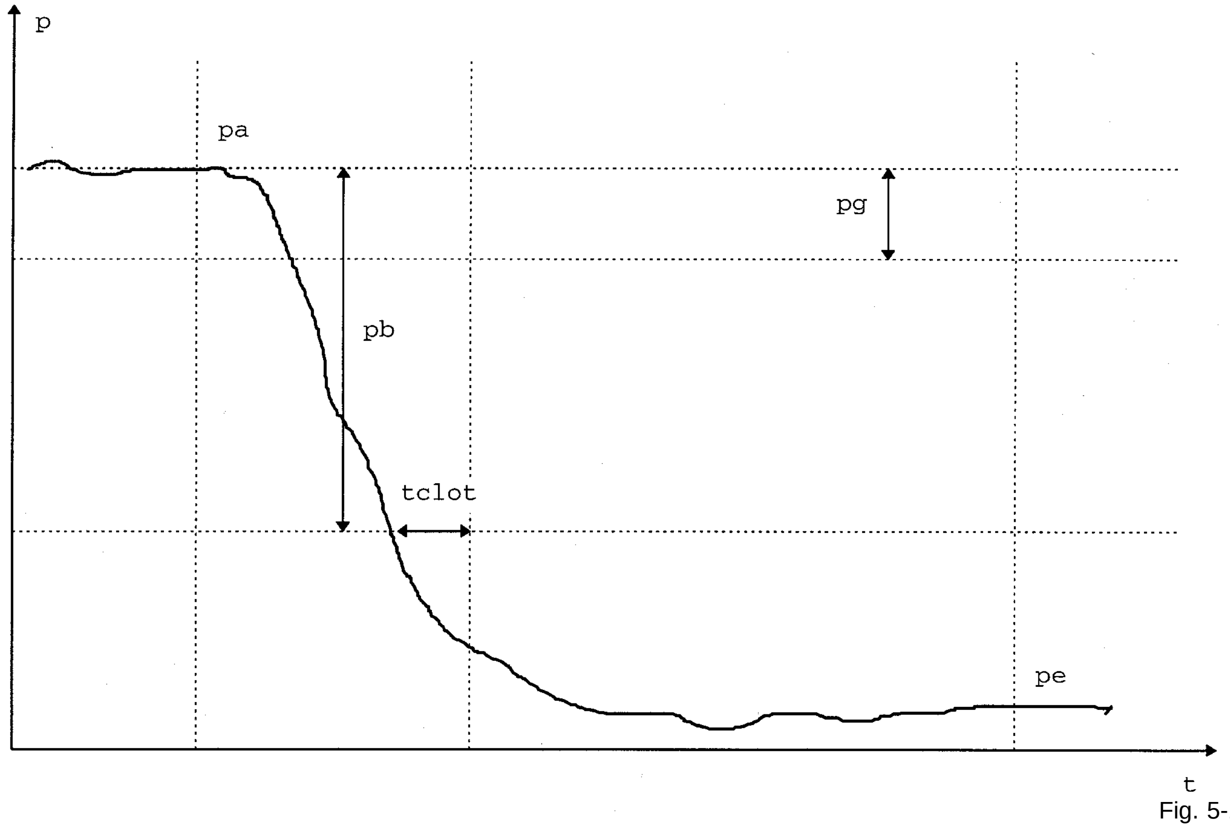


Fig. 5-1b

5.1.6 Measurement cycle with clot detection at the end of a measurement cycle

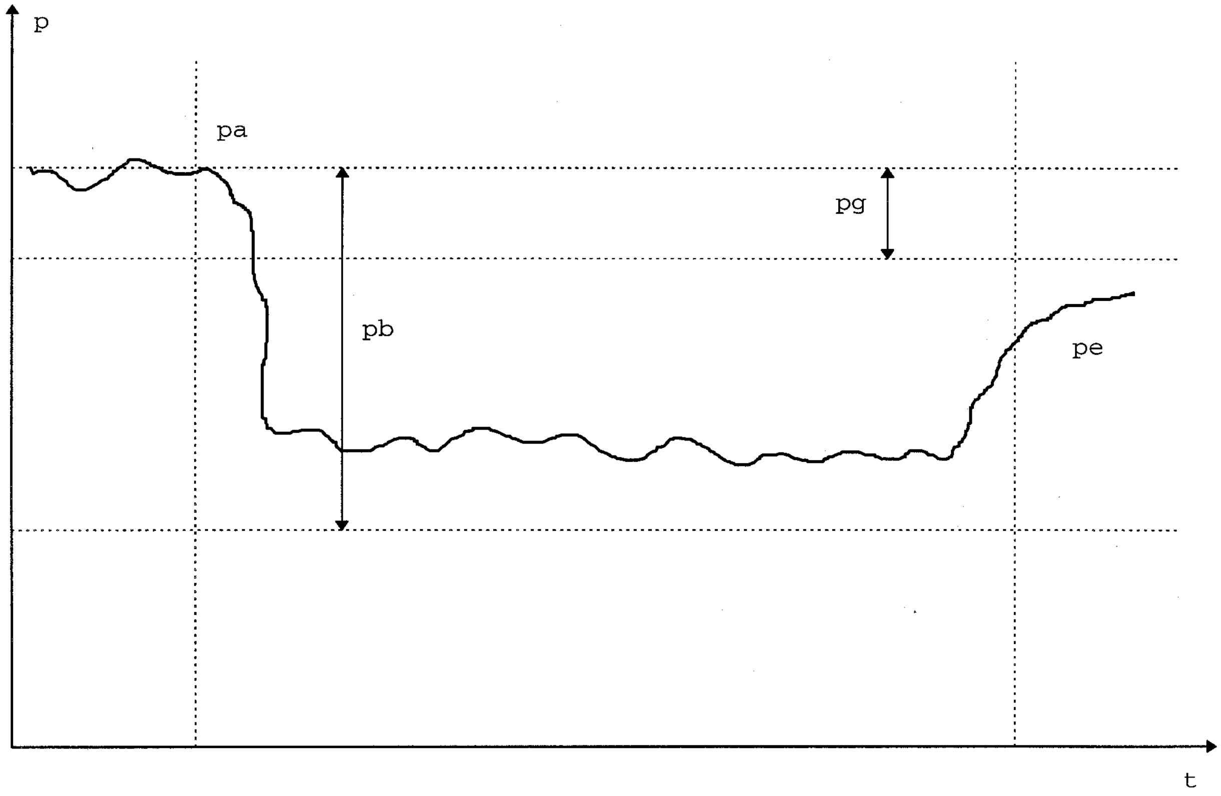


Fig. 5-1c

5.2 Power Supply, Voltage Distribution and Motherboard

5.2.1 General Description

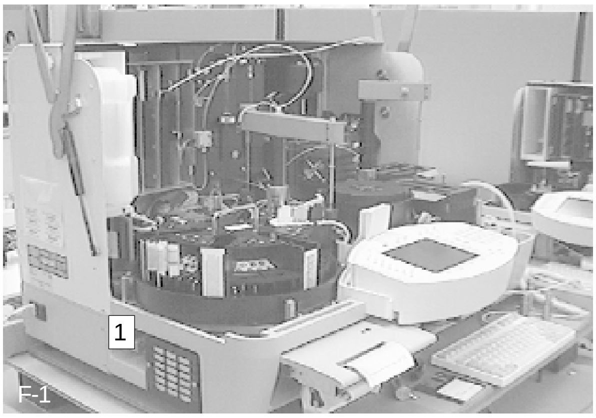
The primary pulsed built-in power supply assy has an input range of 85 - 264V with power correction.
It has 6 secondary voltages:

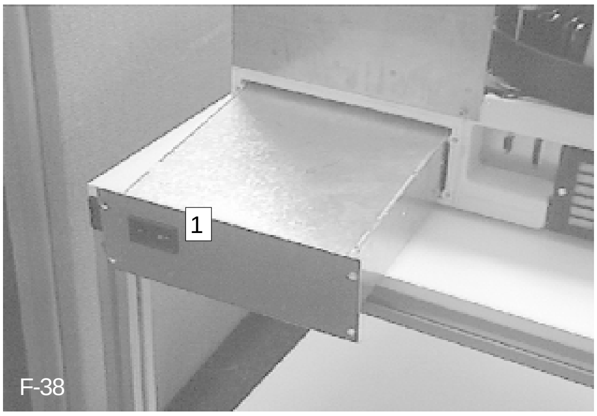
1. Power output voltage of 35V DC for stepping motors and incubation heating.
2. Output voltage of 24V DC for valves, pumps, ventilators, etc.
3. Voltage of approx. 15V DC for peltier assys (bottle temperature, detection module).
4. Bipolar voltage of + / - 15V DC for analog circuits, etc.
5. Supply voltage of +5.2V DC for digital components.

All primary operating elements as for ex. mains plugs and modular connectors are accessible. Two fuses are located inside the power supply assembly to gain access the power supply covers are to be removed. Under normal circumstances a blown fuse indicates a defective power supply.

An excessive starting current is avoided by the power correction (starting current limitation). The primary mains fuses are thus not subject to failure.

5.2.2 Location





1 Power Supply Assy

5.2.3 Functional Description

Primary Voltages

Input voltage: 85...264V AC
Mains frequency: 47...63Hz

Secondary Voltages

The GND potentials of all secondary voltages are connected at different mass points in the instrument.

Voltage range	U1:	35V	+15%
	U2:	24V	+/-10%
	U3:	15V	+/-5%
	U4/5:	+/-15V	+/-5%
	U6:	5.2V	+/-2%

5.2.4 Exchangeable Functional Units:

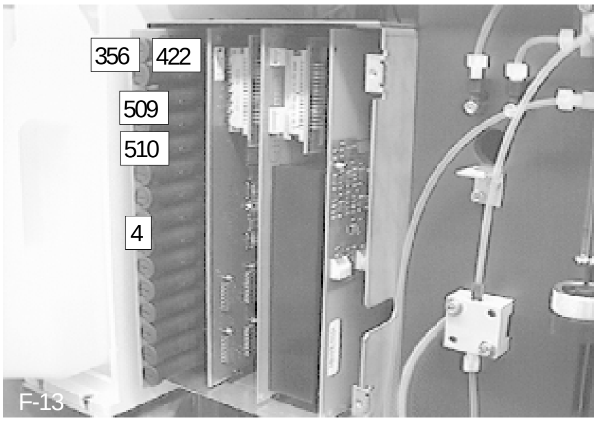
- Power Supply Assy (1)

5.2.5 Voltage Distribution

5.2.6 General Description

The motherboard supplies the modules with the required voltages. The fuses are located on the voltage distribution pcb. The power supply assy is connected to the voltage distribution pcb by a cable.

5.2.7 Location



4	PCB Dist Voltage
356	Fuse cap
422	Fuse holder
509	Fuse 1.6A
510	Fuse 1.15A

5.2.8 Exchangeable Functional Units:

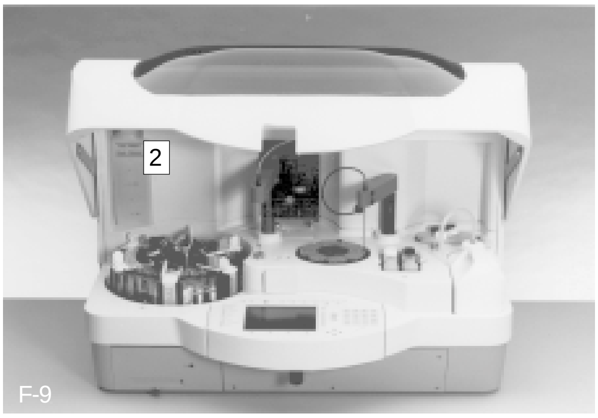
- PCB Dist Voltage (4)
- Fuse cap (356), included in Set 3, see chapter 8
- Fuse holder (422), included in Set 3, see chapter 8
- Fuse 1.6A (509), included in Set 7, see chapter 8
- Fuse 1.15A (510), included in Set 7, see chapter 8

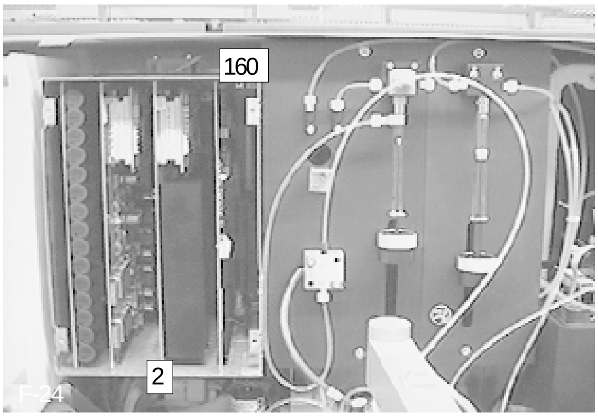
5.2.9 Motherboard

5.2.10 General Description

The motherboard is the rear panel of the electronic rack.

5.2.11 Location





2	PCB Motherboard
160	Electronic rack

5.2.12 Exchangeable Functional Units:

- none

5.3 Electronic Modules

5.3.1 PCB Detection Module BP1 (320)

5.3.1.1 General Description

The PCB Detection Module BP1 (320) is attached to the PCB Dist Detection Module (322) and controls the following functional units:

- PCB Preamp Temperature (45)
- PCB Dist Detection Module (311)
- PCB Preamp High Voltage (310)
- PCB Potentiostat/Motor (318)

- by way of the PCB Preamp Temperature (45):

    - NTC Sensor (42)

- by way of the PCB Dist Detection Module (311):

    - PMT (121)

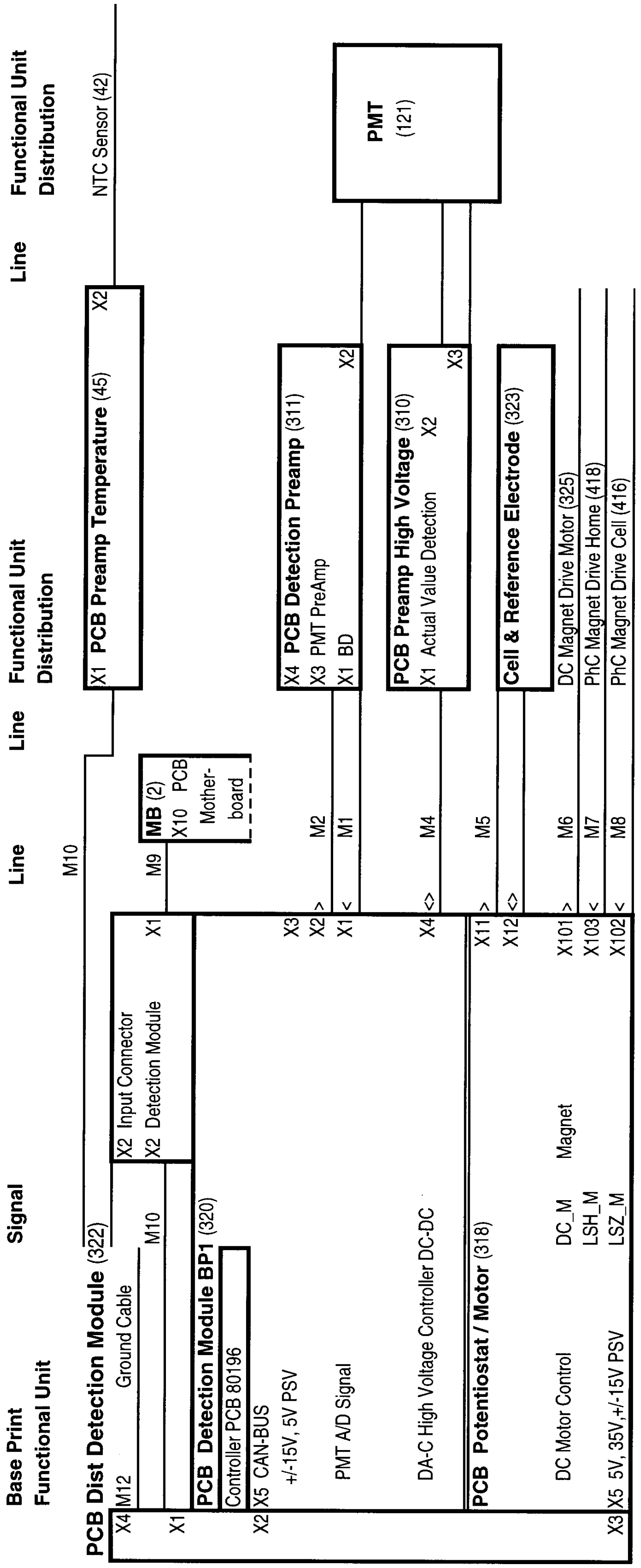
- by way of the PCB Preamp High Voltage (310):

    - PMT (121)

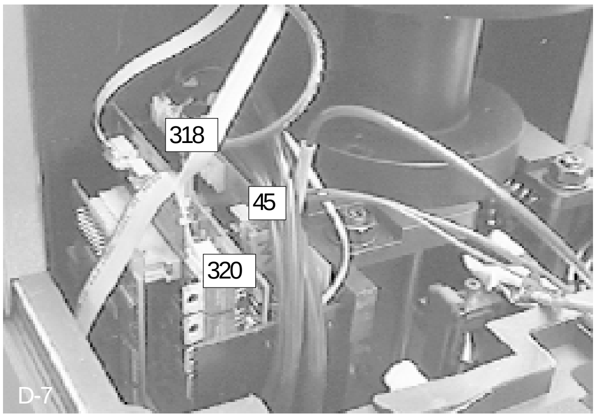
- by way of the PCB Potentiostat/Motor (318):

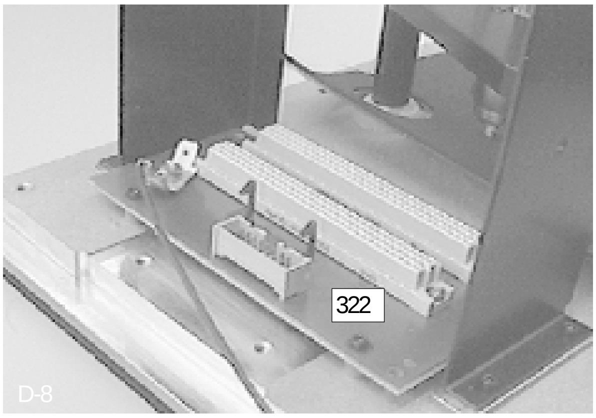
    - Cell and Reference Electrode (323)
    - DC Motor Magnet Drive (325)
    - PhC Magnet Drive Home (418)
    - PhC Magnet Drive Cell (416)

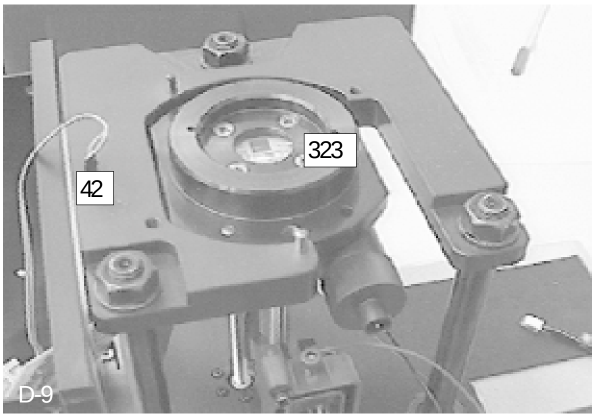
5.3.1.2 Block Diagram

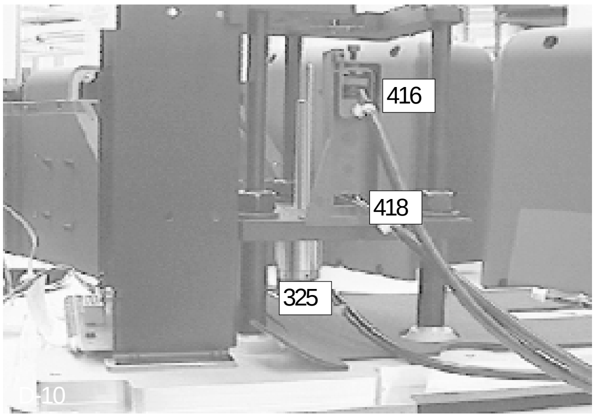

Base Print
Functional Unit
Signal
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
PCB Dist Detection Module (322)
X4
M12
Ground Cable
M10
X1
X2
X3
X2 Input Connector
X2 Detection Module
X1
PCB Detection Module BP1 (320)
Controller PCB 80196
X5 CAN-BUS
+/-15V, 5V PSV
PMT A/D Signal
DA-C High Voltage Controller DC-DC
X3
X2 >
X1 <
X4 <>
PCB Potentiostat / Motor (318)
DC Motor Control
DC_M
Magnet
LSH_M
LSZ_M
X5 5V, 35V,+/-15V PSV
X11 >
X12 <>
X101 >
X103 <
X102 <
M10
M9
MB (2)
X10 PCB
Mother-
board
M2
M1
M4
M5
M6
M7
M8
X1 PCB Preamp Temperature (45)
X2
NTC Sensor (42)
X4 PCB Detection Preamp (311)
X3 PMT PreAmp
X1 BD
X2
PCB Preamp High Voltage (310)
X1 Actual Value Detection
X2
X3
Cell & Reference Electrode (323)
DC Magnet Drive Motor (325)
PhC Magnet Drive Home (418)
PhC Magnet Drive Cell (416)
PMT
(121)

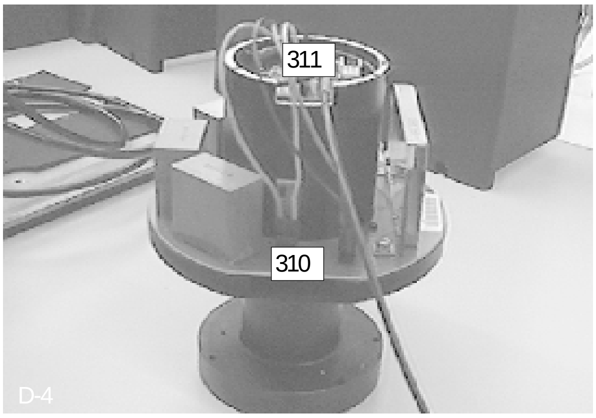
5.3.1.3 Location

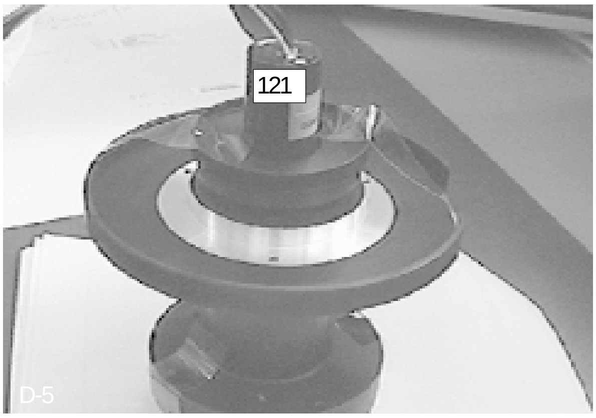

318
45
320
D-7






416
418
325
D-10





42	NTC Sensor
45	PCB Preamp Temperature
121	PMT
310	PCB Preamp High Voltage
311	PCB Detection Preamplifier
318	PCB Potentistat/Motor
320	PCB Detection Module BP1
322	PCB Dist Detection Module
323	Cell and Reference Electrode
325	DC Magnet Drive Motor
416	PhC Magnet Drive Cell
418	PhC Magnet Drive Home

5.3.1.4 Exchangeable Functional Units:

- PCB Preamp Temperature Detection Module (45) with NTC Sensor (42)
- PMT (121)
- PCB Preamp High Voltage (310)
- PCB Detection Preamplifier (311)
- PCB Potentiostat/Motor (318)
- PCB Detection Module BP1 (320)
- PCB Dist Detection Module (322)
- Cell and Reference Electrode (323)
- DC Magnet Drive Motor (325)
- PhC Magnet Drive Cell (416)
- PhC Magnet Drive Home (418)

5.3.1.5 Functional Description

PCB Detection Module BP1 (320)

The PCB Detection Module BP1 controls the following components:

- D/A converter for high-voltage setting
- A/D converter (in 80C196) for reading the dynode voltages and supply voltage (-15 V)
- A/D converter for the PMT signal
- D/A converter for generating the detection cell voltage
- A/D converter for measuring the high voltage, detection cell voltage and cell current.

It virtually controls the entire detection cycle and processes the measured values for further calculations.

The Base Print (BP) carries the above-mentioned components with the required logics. Together with the other PCBs required for operating the detection module, the magnet drive, the PMT itself and the cell, it is located in a light-tight housing.

Inside, the housing is heated to 28 °C + 1.5 °C (warm-up time approximately 1.5 h). All voltage supply lines and the CAN cable are connected to the BP via the connectors located on the housing. The BP is mounted on a Distributor PCB, which also establishes the connections to the potentiostat PCB (voltage control). All other connections to other PCBs within the detection module housing consist of cables. As far as EMC is concerned, the BP has to be considered in conjunction with the detection module and the overall instrument configuration.

Controller PCB:

All BPs, such as PCB Detection Module BP1, have a Controller PCB. The hardware of all Controller PCBs is identical. The Controller PCB is horizontally connected to the BP via two 48-pin multipoint connectors and may be replaced. All signal and supply lines are connected to the Controller PCB via the BP. 3 port lines are led to the BP and binary coded there for BP identification. The PCB Detection Module BP1 carries the number 1 (decimal).

E^2PROM:

The BP includes an E^2PROM and a control circuit to store data specific to the module.

Distributor Module:

Supply and control lines are connected to the distributor module inside from outside via a light-tight plug-and-socket connector, which will then ensure any further distribution to BP1 and the voltage control PCB.

Voltage Supply:

The voltage supply to the BPs is star-shaped and comes from the central voltage distribution (PCB Dist Voltage). The supply lines are appropriately protected on the Distributor PCB (each voltage is protected separately for each BP). Power lines are arranged parallel with GND return. The individual voltages are generated in two circuits in the Power Supply Assy. Except the high and low lines of the CAN bus, there are no connections between the individual BPs.

For BP1 the following (maximum) values apply:

5.2 V DC	+2% -9%	0.35 A	Digital GND
+15 V DC	±5%	0.25 A or -0.1 A	Analog GND
24 V DC	+10 -20%	2 A	for DC Motor

e-Tab531

TUS = Test and Control Software:

The Test and Control Software (TUS) Detection Module, that can be downloaded to the controller, controls the functions. The TUS is based on the Communication and Control Software (KUST) to a great extent but defined in a special specification.

CAN Bus:

The CAN bus lines CAN HIGH and CAN LOW are connected to the Controller PCB via the BP as stubs. For the PCB Detection Module BP1, the CAN IN/OUT (high/low) lines are looped and not designed as terminals. The CAN bus is connected to the supply voltage plug.

PCB Detection Preamplifier (311)

This PCB transforms the current signal detected and preamplified in the PMT into current/voltage prior to transferring it to BP1.

PCB Preamp High Voltage (310)

The PCB Preamp High Voltage supplies the PMT with the voltage that is required to amplify the ECL signal generated in the detection cell. The control range of the voltage is 500V-1100V. This ensures the individual adjustment of the sensitivity of the system.

Cell and Reference Electrode (323)

The cell is the core of the system and is to be replaced at certain intervals. The replacement takes place with the detection module installed. The front cover of the housing has to be removed for replacing the cell. Please refer to Chapter 2.5.3.

PMT (121)

The PMT (photo multiplier tube) is located vertically above the working electrode of the cell. The electroluminescence signal received from the PMT is amplified and converted into an equivalent current.

Motor Magnet Drive (325)

The motor in the detection module brings the magnet in 2 positions towards the cell. Due to the reduction gear of the spindle drive and the speed/acceleration required by the application, a highly dynamic motor is used for this purpose. The positioning of the magnet is effected by a DC motor.

The self-locking capacity of the spindle maintains the magnet in the end position. Therefore, a standing current is not needed by the DC motor. In the end positions, the DC motor consequently has no influence on the thermal conditions in the detection module.

The positions of the magnet are checked by 2 photo couplers (PhC Magnet Drive Home/PhC Magnet Drive Cell). These photo couplers are only turned on while the motor is moving to prevent that light enters the photo couplers during the detection process.

PhC Magnet Drive Home (418)

The photo coupler assy limits the lower position of the magnet and generates a TTL signal.

PhC Magnet Drive Cell (416)

The photo coupler assy limits the upper position of the magnet and generates a TTL signal. Upon reaching the "Cell" position, the motor continues to travel somewhat further until the second slope of the photo coupler is reached and switches off. Between these two points the magnet is held against the bottom of the cell by a spring.

PCB Dist Detection Module (322)

PCB Preamp Temperature (45)

The signal obtained from the sensor is processed and digitized by the PCB Preamp Temperature and finally transmitted to BP1.

NTC Sensor (42)

The sensor detects the temperature in the detection module.

5.3.2 PCB Dilutor Sample BP2 (97)

5.3.2.1 General Description

The PCB Dilutor Sample BP2 (97) controls the following functional units:

- SM Dilutor (236)
- LB Dilutor Home (423)
- SM Valve Dilutor (231)
- LB Dilutor Valve Home (211)

- by way of the PCB Dist MFA "Sipper" (385):

    - SM MFA Up/Down (384)
    - SM MFA Rotation (383)
    - HS MFA Home Up (405)
    - PhC MFA Home Rotation (247)
    - PhC MFA Rotation Forward (248)
    - PhC MFA Rotation Reverse (249)
    - PCB LLD Sipper (100)

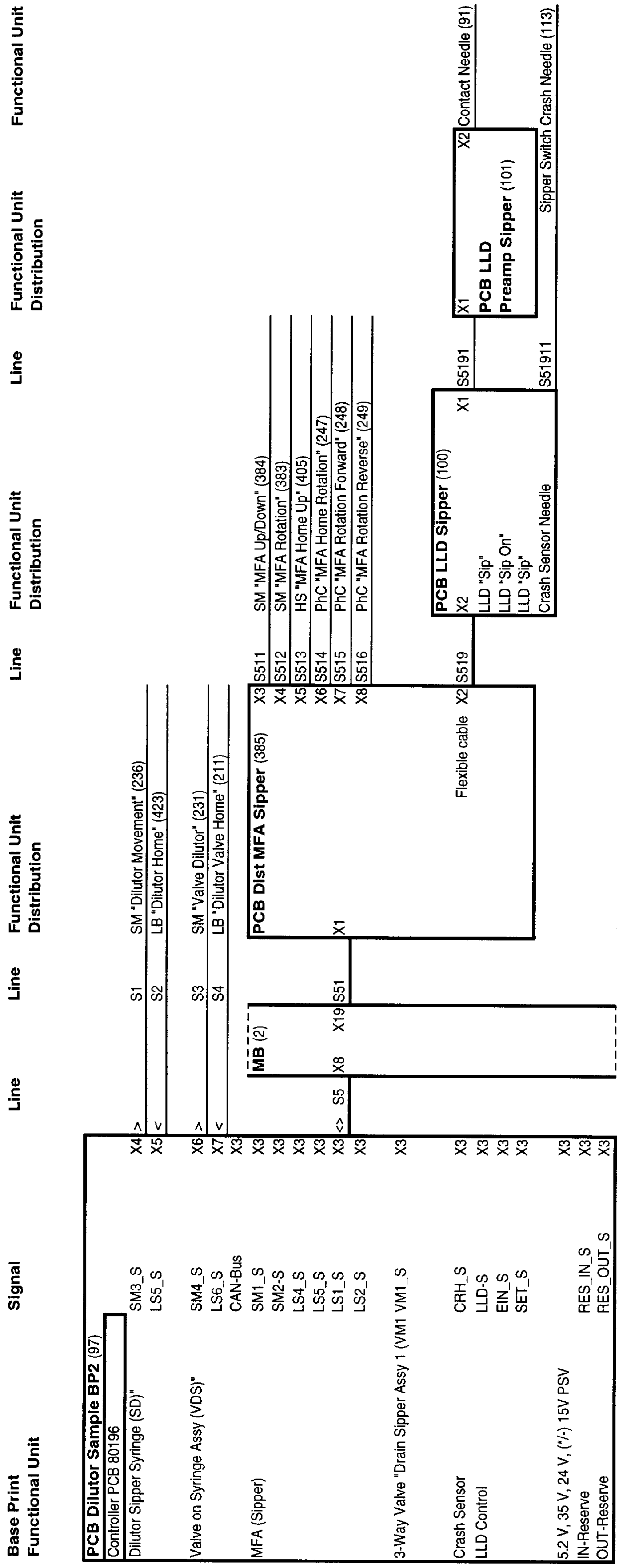
- by way of the PCB LLD Sipper (100):

    - Sipper Switch Crash Needle (113)
    - PCB Preamp LLD Sipper (101)

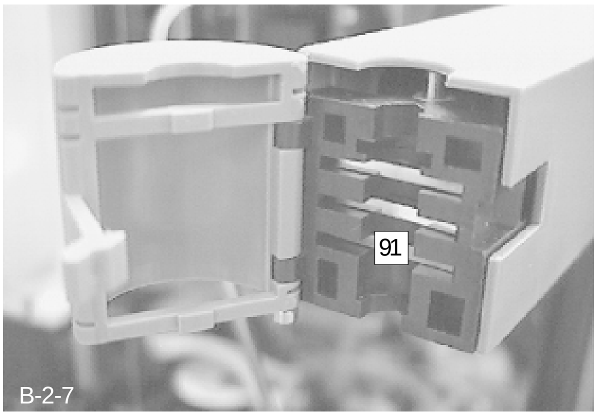
- by way of the PCB Preamp LLD Sipper (101):

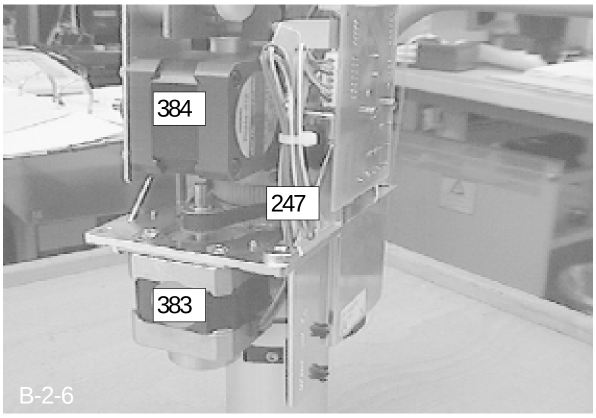
    - Contact Needle (91)

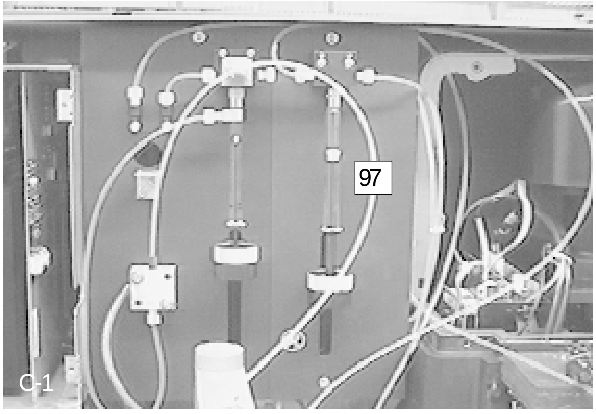
5.3.2.2 Block Diagram

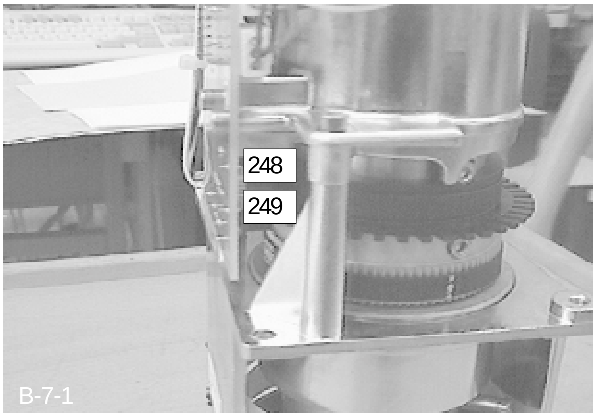

Base Print
Functional Unit
Signal
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Functional Unit
PCB Dilutor Sample BP2 (97)
Controller PCB 80196
Dilutor Sipper Syringe (SD)"
SM3_S
LS5_S
Valve on Syringe Assy (VDS)"
SM4_S
LS6_S
CAN-Bus
MFA (Sipper)
SM1_S
SM2-S
LS4_S
LS5_S
LS1_S
LS2_S
3-Way Valve "Drain Sipper Assy 1 (VM1 VM1_S
Crash Sensor
CRH_S
LLD Control
LLD-S
EIN_S
SET_S
5.2 V, 35 V, 24 V, (+/-) 15V PSV
IN-Reserve
RES_IN_S
OUT-Reserve
RES_OUT_S
X4
X5
X6
X7
X3
>
<
<>
S5
MB (2)
X8
X19
S1
S2
S3
S4
S51
SM "Dilutor Movement" (236)
LB "Dilutor Home" (423)
SM "Valve Dilutor" (231)
LB "Dilutor Valve Home" (211)
PCB Dist MFA Sipper (385)
X1
X2
Flexible cable
S511
S512
S513
S514
S515
S516
S519
SM "MFA Up/Down" (384)
SM "MFA Rotation" (383)
HS "MFA Home Up" (405)
PhC "MFA Home Rotation" (247)
PhC "MFA Rotation Forward" (248)
PhC "MFA Rotation Reverse" (249)
PCB LLD Sipper (100)
LLD "Sip"
LLD "Sip On"
LLD "Sip"
Crash Sensor Needle
S5191
S51911
PCB LLD
Preamp Sipper (101)
Contact Needle (91)
Sipper Switch Crash Needle (113)

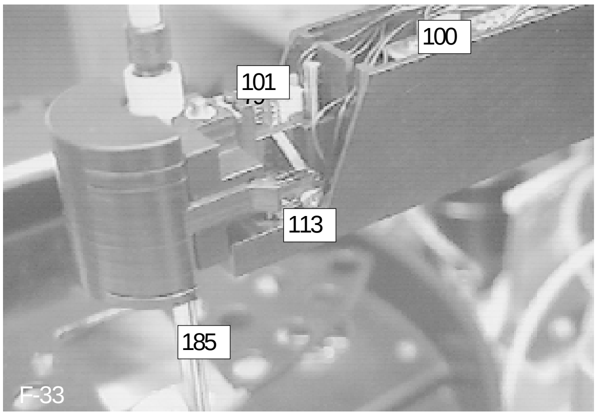
5.3.2.3 Location

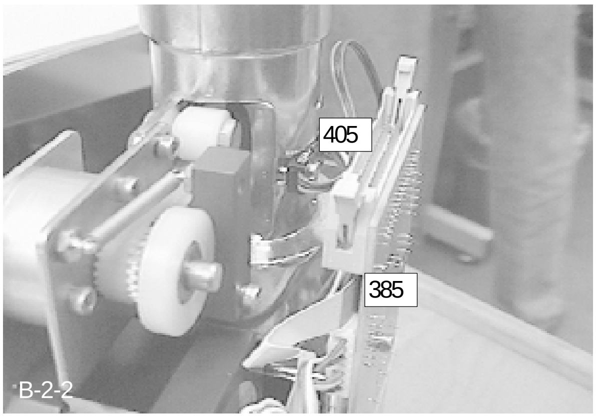


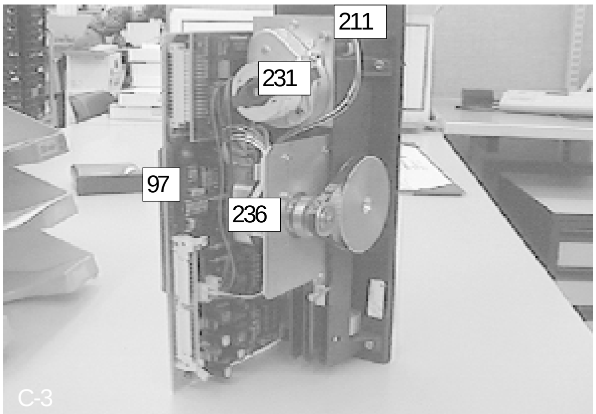

384
247
383
B-2-6



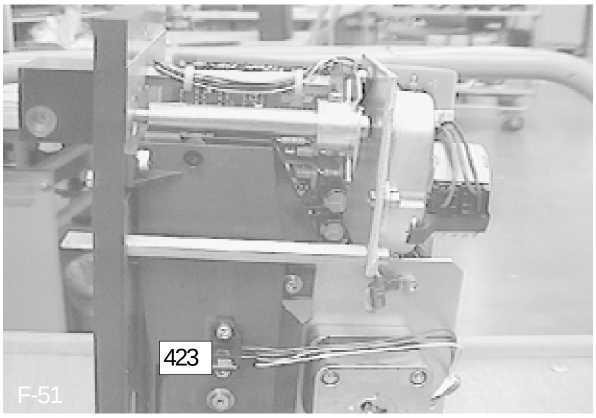



100
101
113
185
F-33




211
231
97
236
C-3

91	Contact Needle
97	PCB Dilutor Sample BP2
100	PCB LLD Sipper
101	PCB Preamp LLD Sipper
113	Sipper Switch Crash Needle
185	Needle S/R
211	LB Dilutor Valve Home
231	SM Valve Dilutor
236	SM Dilutor
247	PhC MFA Home Rotation
248	PhC MFA Rotation Forward
249	PhC MFA Rotation Reverse
383	SM MFA Rotation
384	SM MFA Up/Down
385	PCB Dist MFA Sipper
405	HS MFA Home Up



423 LB Dilutor Home (423)

5.3.2.4 Exchangeable Functional Units:

- Contact Needle (91)
- PCB Dilutor Sample BP2 (97)
- PCB LLD Sipper (100)
- PCB Preamp LLD Sipper (101)
- Sipper Switch Crash Needle (113)
- LB Dilutor Valve Home (211)
- SM Valve Dilutor (231)
- SM Dilutor (236)
- SM MFA Rotation (383)
- SM MFA Up/Down (384)
- PCB Dist MFA (385)
- HS MFA Home Up (405)
- LB Dilutor Home (423)

5.3.2.5 Functional Description

PCB Dilutor Sample BP2 (97)

Base Print:

The PCB Dilutor Sample BP2 carries all driver components. BP2 is integrated in the sample dilutor. The whole assembly can be removed from the instrument to the font. The assembly is enclosed by a metal box (rack) that ensures compliance with the EMC requirements. The front plate and the box are connected to the basic frame of Elecsys 1010 according to HF requirements. The MFA sipper system is connected to the motherboard via a cable. A Distributor PCB on the MFA redistributes the connections. The connections are plugged on BP2 and the Distributor PCB.

MFA Wiring:

The wiring is part of the MFAs. The LLD and crash sensor lines are connected through the center of the MFA shaft by means of a flexible cable. They are connected to the PCB Dist MFA and the MFA and may be disconnected.

Controller PCB:

All BPs, such as PCB Dilutor Sample BP2, have a Controller PCB. The hardware of all Controller PCBs is identical. The Controller PCB is horizontally connected to the BP via two multipoint connectors. All signal and supply lines are connected to the Controller PCB via the BP. 3 port lines are led to the BP and binary coded there for BP identification. The PCB Dilutor Sample BP2 carries the number 2 (decimal).

E^{2}PROM:

The BP includes an E^{2}PROM and a control circuit to store data specific to the module.

Photo Couplers:

The photo couplers are continuously supplied with current.

Plug-and-Socket Connectors:

The plugs are continuously numbered X1 thru X5 on the component assembly. The BP is connected to the motherboard (X3) via a 60 pole (2*30) connector with a locking device for vertical mounting including a protection against wiring in opposition direction.

Voltage Supply to the Base Print:

The voltage supply to the BPs is star-shaped and comes from the central voltage distribution (PCB Dist Voltage). The individual voltages are generated in the Power Supply Assy. The GND lines are joined together on the BP. The supply lines are protected on the Distributor PCB. Power lines are arranged parallel with GND return. The supply lines are connected from the motherboard via a flat cable and plug X3. At high loads, contacts are switched parallel. Except the high and low lines of the CAN bus, there are no supply line connections between the individual BPs. The supply voltages are divided accordingly and applied to the AD-C of the controller.

Voltage Voltage Supply:	Tolerance	Current	Control Limits Lower Limit-Upper Limit +/-2%	Application
5.2V	+2% -2%	1 A		
GND		1 A		Digital GND
+15V	±5%	0.5 A	13.6-16.0 V	
GND		0.5 A		Analog GND
-15V	±5%	0.5 A		
24V	±10%	2 A	21.0-28.0 V	for Valves
GND		2 A		
35V	+15%,-10%	3 A	30.0 - 41.0 V	for SM
GND		3 A		

e-Tab533

The voltages + 15V, 24V and 35V are controlled by the module. If an error occurs, an error message will appear. Error: 3 inquiries at intervals of 1 second indicate that the value is above or below the values given above. The handling of the message is defined in the Communication and Control Software (KUST).

EMC/EMB Protection:

The connecting cable to the motherboard (flat cable) is placed flat on the housing of the metal box (main ground) by means of a metal sheet to ensure a capacitive uncoupling of ground faults.

Communication and Control Software (KUST):

The functions are controlled by the Communication and Control Software (KUST) Sipper. KUST is resident in the controller and can be downloaded.

CAN Bus:

The CAN bus lines CAN HIGH and CAN LOW are looped on the BP and connected to the Controller PCB as stubs. That means, 2*CAN-IN and 2*CAN-Out lines are applied to plug X3. The BP is not designed as a terminal. An assembly position for a terminating resistance is provided on the controller, however.

PCB Dist MFA "Sipper" (385)

The PCB connects the stepping motors, photo couplers and sensors of the MFA via cable and motherboard with BP2.

PCB LLD Sipper (100)

The LLD is fixed to the sipper arm and detects the liquid levels of the incubation vessels, assay buffer/cell cleaner bottle packs 1+2 and wash stations. The detection consists of an evaluation of a change in capacity between sipper needle and reference electrode once the needle contacts the liquid surface. The LLD consists of a monoaxial pipettor needle and the PCB LLD Sipper. The PCB LLD Sipper processes the signal received from the PCB Preamp LLD Sipper. Furthermore, it constitutes the electric connection of the crash sensor and the cable through the hollow shaft.

PCB Preamp LLD Sipper (101)

The signal received from the needle is processed in the PCB Preamp LLD Sipper and transmitted to PCB LLD Sipper. The PCB is located in the movable part of the sipper arm, where the needle contacts are.

SM Dilutor (236)

The dilutor stepping motor drives the piston of the dilutor in the micro-step mode via toothed racks.

LB Dilutor Home (423)

The dilutor home photosensor monitors the home position of the SM Dilutor (236).

SM Valve Dilutor (231)

The dilutor valve stepping motor drives the VSD valve in the full-step mode.

LB Dilutor (211)

The dilutor valve home sensor monitors the position of the VSD valve.

SM (MFA) Rotation (384)

The MFA up/down stepping motor generates the vertical movement of the sipper arm.

SM (MFA) Rotation (383)

The MFA rotation stepping motor generates the rotational movement of the sipper arm.

Hall Sensor (MFA) (405)

The MFA up home sensor detects the home position of the sipper arm in the vertical direction.

PhC MFA Home Rotation (247)

The MFA home rotation photo coupler is located in the middle of the travel way. When overtraveling this position, the counter is set to zero.

PhC MFA Rotation Forward (248)

The MFA rotation forward and the MFA rotation reverse photo couplers monitor the direction of rotation forwards and backwards. By relocating the photo couplers (90°), the direction of rotation can be detected via the slopes of the chopper disk. The signals will be evaluated by the software of the BP5 Controller.

Photo Coupler MFA Rotation Reverse (249)

The MFA rotation reverse and the MFA rotation forward photo couplers monitor the direction of rotation forwards and backwards. By relocating the photo couplers (90°), the direction of rotation can be detected via the slopes of the chopper disk. The signals will be evaluated by the software of the BP5 Controller.

Contact Needle (91)

The contact needle establishes the electrical connection (1 pole) from the monoaxial needle to the PCB LLD Sipper.

Sipper Switch Crash Needle (113)

The sipper switch indicates when the triaxial needle is obstructed during the horizontal downward movement.

5.3.3 PCB Temp Module BP3 (46)

5.3.3.1 General Description

The PCB Temp Module BP3 controls the following functional units:

- PCB Preamp Temperature Bottle 1 (47)
- PCB Preamp Temperature Bottle 2 (47)
- PCB Preamp Temp Preheater (40)
- PCB Waste Level (223)
- Peltier Assy 1 Bottle Temp 1 (55)
- Peltier Assy 2 Bottle Temp 2 (55)
- Peltier Assy 3 Preheater (302)
- Peltier Assy 4 Detection Module (301)
- Peltier Assy 5 Detection Module (301)

- by way of the PCB Preamp Temperature Bottle 1 (47):

    - NTC Sensor (54)

- by way of the PCB Preamp Temperature Bottle 2 (47):

    - NTC Sensor (54)

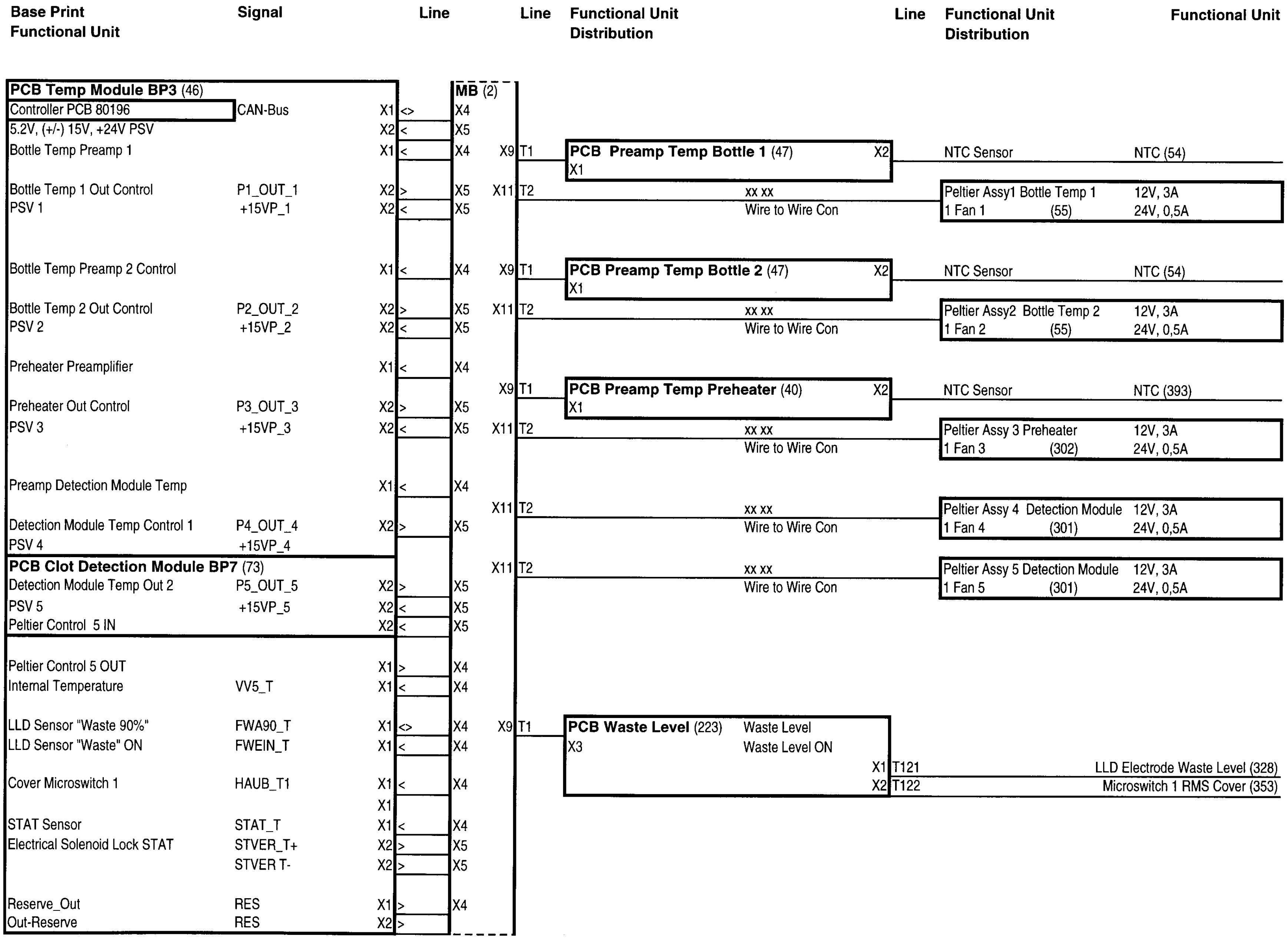
- by way of the PCB Preamp Temp Preheater (40):

    - NTC Sensor (393)

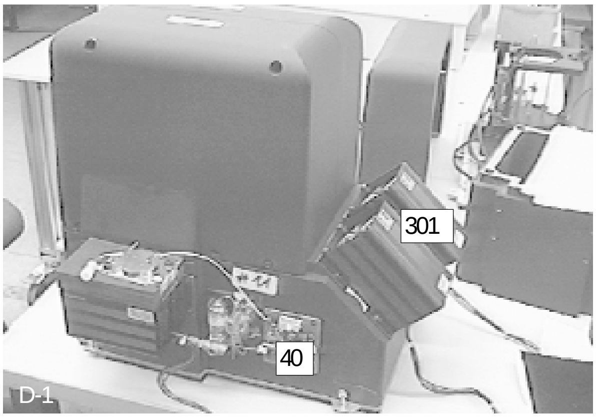
- by way of the PCB Waste Level (223):

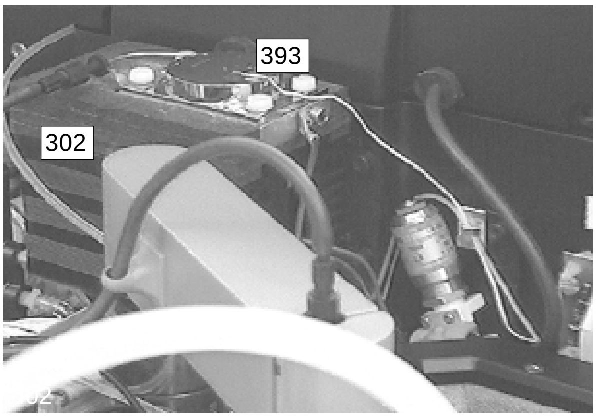
    - LLD Electrode (328)
    - Cover Switch 1; Microswitch (353)

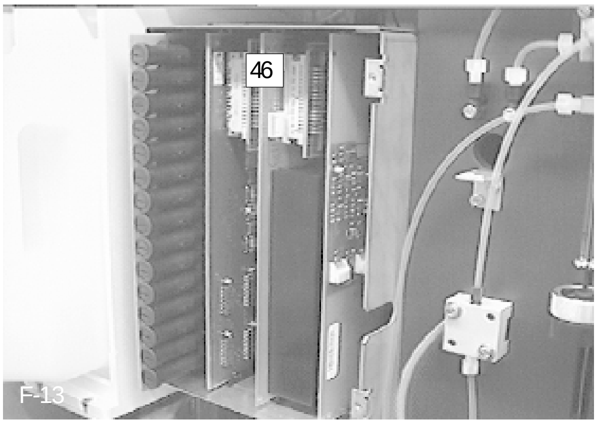
5.3.3.2 Block Diagram

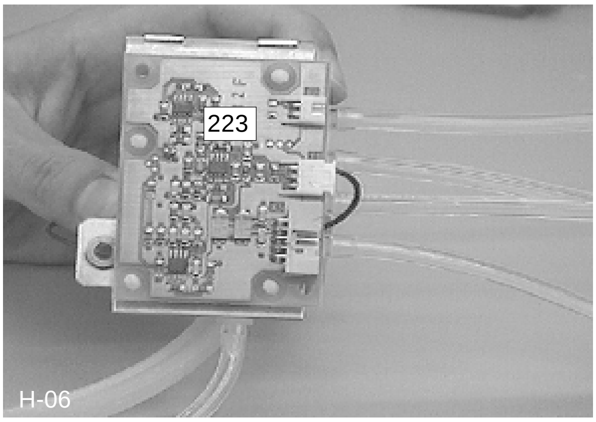

Base Print Functional Unit
Signal
Line
Line
Functional Unit Distribution
Line
Functional Unit Distribution
Functional Unit
PCB Temp Module BP3 (46)
MB (2)
Controller PCB 80196
CAN-Bus
X1 <> X4
5.2V, (+/-) 15V, +24V PSV
X2 < X5
Bottle Temp Preamp 1
X1 < X4
X9 T1
PCB Preamp Temp Bottle 1 (47)
X1
X2
NTC Sensor
NTC (54)
Bottle Temp 1 Out Control
P1_OUT_1
X2 > X5
X11 T2
xx xx
Wire to Wire Con
Peltier Assy1 Bottle Temp 1
1 Fan 1 (55)
12V, 3A
24V, 0,5A
PSV 1
+15VP_1
X2 < X5
Bottle Temp Preamp 2 Control
X1 < X4
X9 T1
PCB Preamp Temp Bottle 2 (47)
X1
X2
NTC Sensor
NTC (54)
Bottle Temp 2 Out Control
P2_OUT_2
X2 > X5
X11 T2
xx xx
Wire to Wire Con
Peltier Assy2 Bottle Temp 2
1 Fan 2 (55)
12V, 3A
24V, 0,5A
PSV 2
+15VP_2
X2 < X5
Preheater Preamplifier
X1 < X4
X9 T1
PCB Preamp Temp Preheater (40)
X1
X2
NTC Sensor
NTC (393)
Preheater Out Control
P3_OUT_3
X2 > X5
PSV 3
+15VP_3
X2 < X5
X11 T2
xx xx
Wire to Wire Con
Peltier Assy 3 Preheater
1 Fan 3 (302)
12V, 3A
24V, 0,5A
Preamp Detection Module Temp
X1 < X4
X11 T2
xx xx
Wire to Wire Con
Peltier Assy 4 Detection Module
1 Fan 4 (301)
12V, 3A
24V, 0,5A
Detection Module Temp Control 1
P4_OUT_4
X2 > X5
PSV 4
+15VP_4
PCB Clot Detection Module BP7 (73)
X11 T2
xx xx
Wire to Wire Con
Peltier Assy 5 Detection Module
1 Fan 5 (301)
12V, 3A
24V, 0,5A
Detection Module Temp Out 2
P5_OUT_5
X2 > X5
PSV 5
+15VP_5
X2 < X5
Peltier Control 5 IN
X2 < X5
Peltier Control 5 OUT
X1 > X4
Internal Temperature
VV5_T
X1 < X4
LLD Sensor "Waste 90%"
FWA90_T
X1 <> X4
X9 T1
PCB Waste Level (223)
X3
Waste Level
Waste Level ON
LLD Sensor "Waste" ON
FWEIN_T
X1 < X4
X1 T121
LLD Electrode Waste Level (328)
X2 T122
Microswitch 1 RMS Cover (353)
Cover Microswitch 1
HAUB_T1
X1 < X4
X1
STAT Sensor
STAT_T
X1 < X4
Electrical Solenoid Lock STAT
STVER_T+
X2 > X5
STVER T-
X2 > X5
Reserve_Out
RES
X1 > X4
Out-Reserve
RES
X2 >

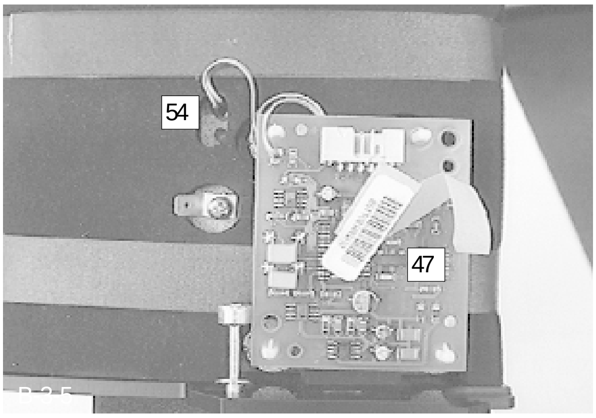
5.3.3.3 Location

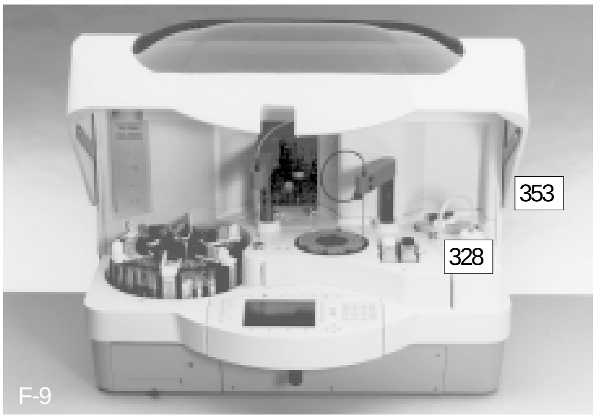


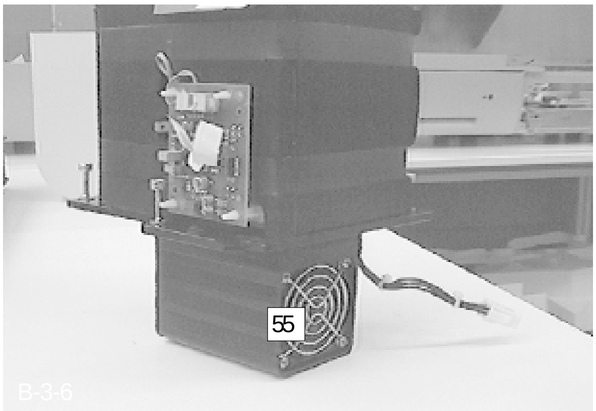












40	PCB Preamp Temp Preheater
46	PCB Temp Module BP3
47	PCB Preamp Temperature Bottle 1, identical with PCB Preamp Temperature Bottle 2
54	NTC Sensor
55	Peltier Assy Bottle Temp 1, identical with Peltier Assy Bottle Temp 2
223	PCB Waste Level
301	Peltier Assy Bottle Temp 4 and Peltier Assy Bottle Temp 5
302	Peltier Assy Bottle Temp 3
328	LLD Electrode
353	Cover Switch 1; Microswitch
393	NTC Sensor

5.3.3.4 Exchangeable Functional Units:

- PCB Preamp Temp Preheater (40), with NTC Sensor (393)
- PCB Temp Module BP3 (46)
- PCB Preamp Temperature Bottle 1, identical with PCB Preamp Temperature Bottle 2 (47), and NTC Sensor (54)
- Peltiere Assy Bottle Temp 1, identical with Peltiere Assy Bottle Temp 2 (55)
- PCB Waste Level (223)
- Peltiere Assy 4 Detection Module and Peltiere Assy 5 Detection Module (301)
- Peltier Assy 3 Preheater (302)
- Cover Switch 1; Microswitch (353)

5.3.3.5 Functional Description

PCB Temp Module BP3 (46)

Each of the control circuits consists of a sensor, a control element (Peltier element with driver stage) and a digital controller. All controllers are controlled by the controller on BP3. Four output stages are located on BP3 and one on BP7. The drivers are triggered digitally. The output voltages to the Peltier elements are analog (LC filter), however, to reduce interference in the system.

PCB Preamp Temperature Bottle 1 or 2 (47)

The signal obtained from sensor 1 or 2 is processed and digitized in the PCB Preamp Temperature. After that, the signal is transmitted to BP3. The special calibration value is stored in E^{2}PROM on board.

PCB Preamp Temperature Preheater (40)

The signal obtained from sensor 3 is processed and digitized in the PCB Preamp Temperature Preheater. After that, the signal is transmitted to BP3. The special calibration value is stored in E^{2}PROM on board.

NTC Sensor 1 or 2 (54)

Sensor 1 or 2 (NTC resistor) detects the temperature of the bottle housing 1 or 2.

Peltier Assy 1 or 2 Bottle Temp (55)

The Peltier Assy Bottle Temp Control 1 or 2 heats the bottle housing 1 or 2 to 28 °C. This is controlled by BP3.
The Peltier assy incorporates a fan, which increases the cooling effect. The fan is directly connected to 24V and operates continuously.

NTC Sensor 3 (393)

The sensor detects the temperature in the preheater.

Peltier Assy 3 Preheater (302)

The Peltier assy 3 controls the temperature of the preheater. The incubate is heated to 28 °C in a metal coil. After that, the incubate flows into the detection cell.
The Peltier assy incorporates a fan, which increases the cooling effect. The fan is directly connected to 24V and operates continuously.

Peltier Assy 4 or 5 Detection Module (301)

The Peltier Assy 4 or 5 controls the temperature of the detection module to 28°C. The Peltier assy incorporates a fan, which increases the cooling effect. The fan is directly connected to 24V and operates continuously.

LLD Electrode (328)

The LLD electrode uses the LLD principle to detect the liquid level in the waste bottle. It is positioned so that the liquid reaches the electrode at a filling capacity of 90%.

Cover Switch 1; Microswitch (353)

Cover switch 1 detects when the top cover of the instrument is closed (safety feature!).

PCB Waste Level (223)

The waste level PCB processes the signal obtained from the LLD electrode and transmits it to BP3.

5.3.4 PCB Rotor/Rotor Module BP4 (6)

5.3.4.1 General Description

The PCB Rotor/Rotor Module BP4 (6) controls the following functional units:

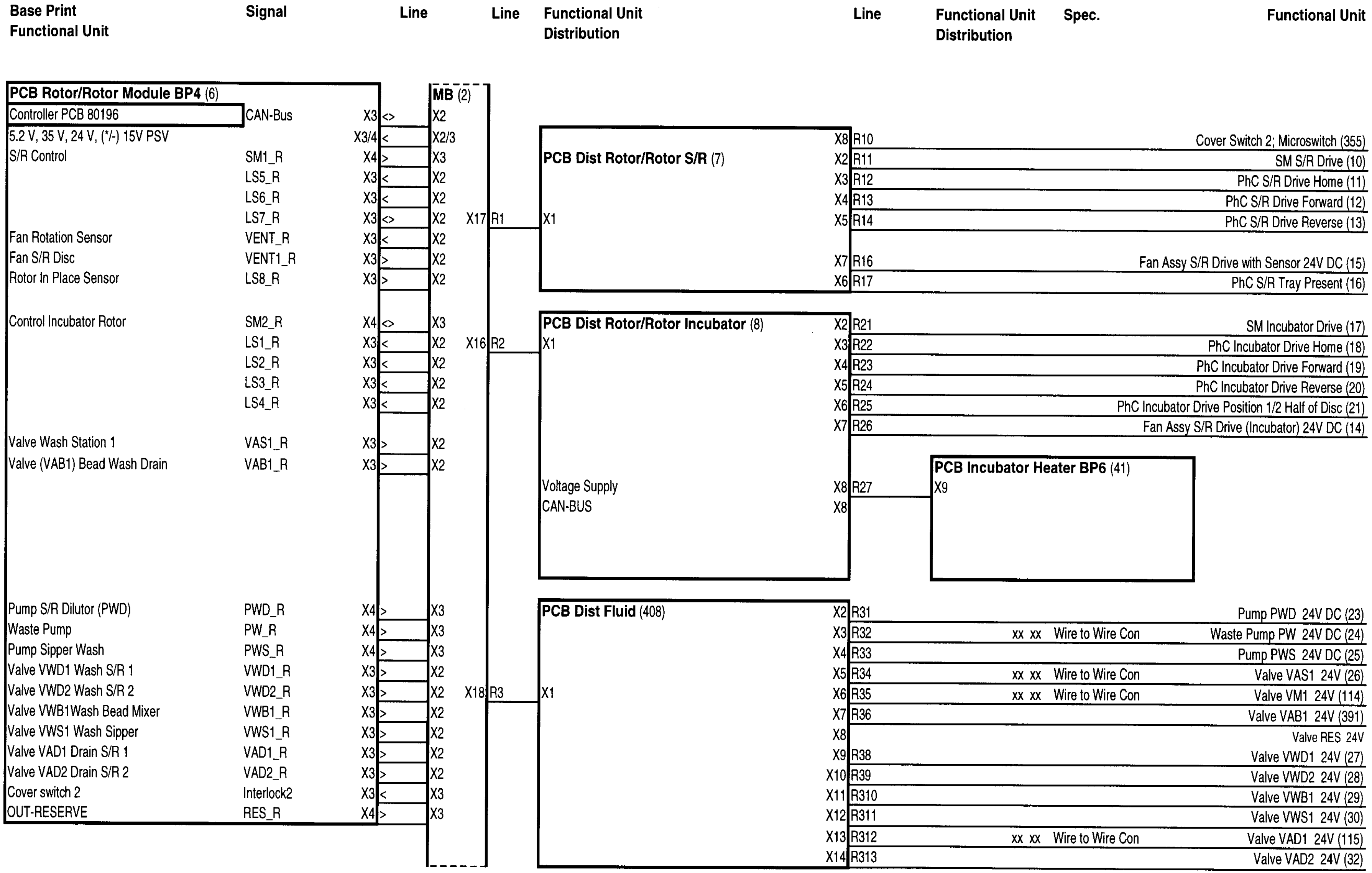
- PCB Dist Rotor/Rotor S/R (7)
- PCB Dist Rotor/Rotor Incubator (8)
- PCB Dist Fluid (408)

- by way of the PCB Dist Rotor/Rotor S/R (7):
  - Cover Switch 2; Microswitch (355)
  - SM S/R Drive (10)
  - PhC S/R Drive Home (11)
  - PhC S/R Drive Forward (12)
  - PhC S/R Drive Reverse (13)
  - Fan Assy S/R Drive with Sensor (15)
  - PhC S/R Tray Present (16)

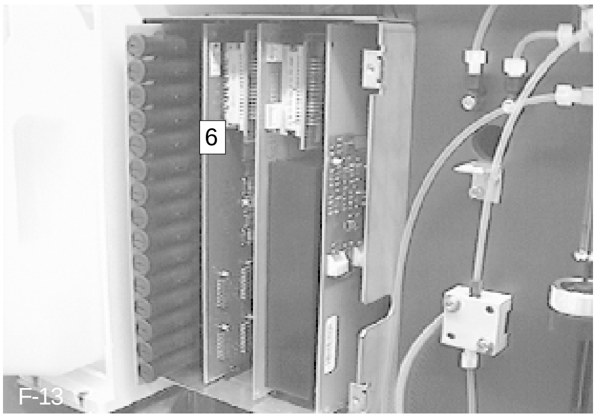
- by way of the PCB Dist Rotor/Rotor Incubator (8):
  - SM Incubator Drive (17)
  - PhC Incubator Drive Home (18)
  - PhC Incubator Drive Forward (19)
  - PhC Incubator Drive Reverse (20)
  - PhC Incubator Drive Position (21)
  - Fan Assy S/R Drive (14)
  - PCB Incubator Heater BP 6 (41) is connected, for description see 5.3.6 PCB Incubator Heater BP6

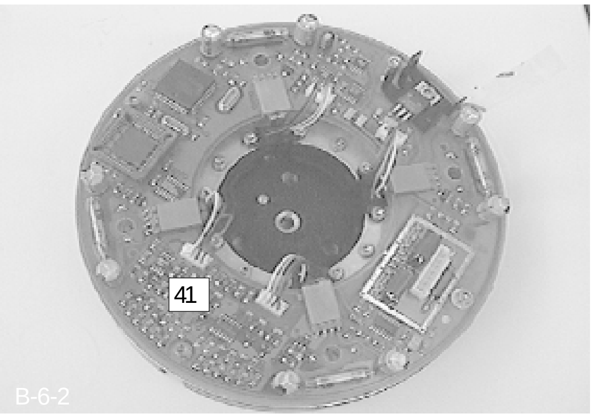
- by way of the PCB Dist Fluid (408):
  - Membrane Pump PWD (23)
  - Waste Pump (24)
  - Membrane Pump PWS (25)
  - Magnet Valve VAS1 (26)
  - Magnet Valve Assy VM1 (114)
  - Magnet Valve Assy VAB1 (391)
  - Magnet Valve 3-Way VWD1 (27)
  - Magnet Valve 3-Way VWD2 (28)
  - Magnet Valve 3-Way VWB1 (29)
  - Magnet Valve VWS1 (30)
  - Magnet Valve VAD 1 (115)
  - Magnet Valve Assy VAD2 (32)

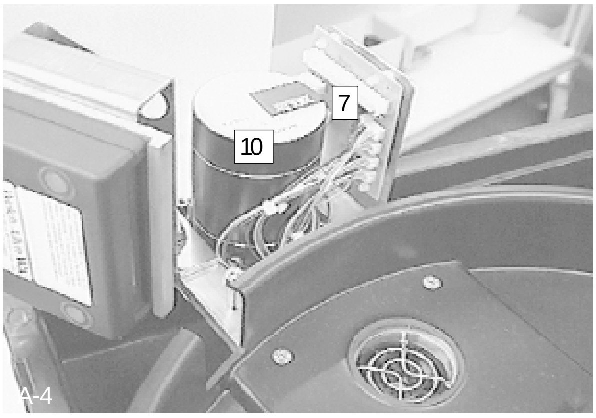
5.3.4.2 Block Diagram

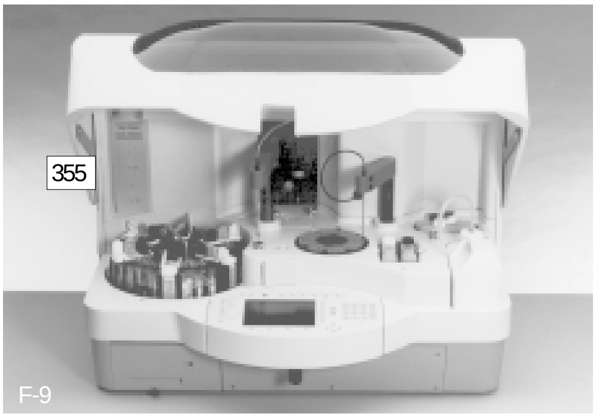

Base Print
Functional Unit
Signal
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Spec.
Functional Unit
PCB Rotor/Rotor Module BP4 (6)
Controller PCB 80196
CAN-Bus
X3 <>
5.2 V, 35 V, 24 V, (*/-) 15V PSV
X3/4 <
S/R Control
SM1_R X4 >
LS5_R X3 <
LS6_R X3 <
LS7_R X3 <>
Fan Rotation Sensor
VENT_R X3 <
Fan S/R Disc
VENT1_R X3 >
Rotor In Place Sensor
LS8_R X3 >
Control Incubator Rotor
SM2_R X4 <>
LS1_R X3 <
LS2_R X3 <
LS3_R X3 <
LS4_R X3 <
Valve Wash Station 1
VAS1_R X3 >
Valve (VAB1) Bead Wash Drain
VAB1_R X3 >
Pump S/R Dilutor (PWD)
PWD_R X4 >
Waste Pump
PW_R X4 >
Pump Sipper Wash
PWS_R X4 >
Valve VWD1 Wash S/R 1
VWD1_R X3 >
Valve VWD2 Wash S/R 2
VWD2_R X3 >
Valve VWB1Wash Bead Mixer
VWB1_R X3 >
Valve VWS1 Wash Sipper
VWS1_R X3 >
Valve VAD1 Drain S/R 1
VAD1_R X3 >
Valve VAD2 Drain S/R 2
VAD2_R X3 >
Cover switch 2
Interlock2 X3 <
OUT-RESERVE
RES_R X4 >
MB (2)
X2
X2/3
X3
X2
X2
X2
X2
X2
X2
X3
X2
X2
X2
X2
X2
X2
X3
X3
X3
X2
X2
X2
X2
X2
X2
X3
X3
X17 R1
X16 R2
X18 R3
PCB Dist Rotor/Rotor S/R (7)
X1
X8 R10 Cover Switch 2; Microswitch (355)
X2 R11 SM S/R Drive (10)
X3 R12 PhC S/R Drive Home (11)
X4 R13 PhC S/R Drive Forward (12)
X5 R14 PhC S/R Drive Reverse (13)
X7 R16 Fan Assy S/R Drive with Sensor 24V DC (15)
X6 R17 PhC S/R Tray Present (16)
PCB Dist Rotor/Rotor Incubator (8)
X1
X2 R21 SM Incubator Drive (17)
X3 R22 PhC Incubator Drive Home (18)
X4 R23 PhC Incubator Drive Forward (19)
X5 R24 PhC Incubator Drive Reverse (20)
X6 R25 PhC Incubator Drive Position 1/2 Half of Disc (21)
X7 R26 Fan Assy S/R Drive (Incubator) 24V DC (14)
Voltage Supply
CAN-BUS
X8 R27
X8
PCB Incubator Heater BP6 (41)
X9
PCB Dist Fluid (408)
X1
X2 R31 Pump PWD 24V DC (23)
X3 R32 xx xx Wire to Wire Con Waste Pump PW 24V DC (24)
X4 R33 Pump PWS 24V DC (25)
X5 R34 xx xx Wire to Wire Con Valve VAS1 24V (26)
X6 R35 xx xx Wire to Wire Con Valve VM1 24V (114)
X7 R36 Valve VAB1 24V (391)
X8 Valve RES 24V
X9 R38 Valve VWD1 24V (27)
X10 R39 Valve VWD2 24V (28)
X11 R310 Valve VWB1 24V (29)
X12 R311 Valve VWS1 24V (30)
X13 R312 xx xx Wire to Wire Con Valve VAD1 24V (115)
X14 R313 Valve VAD2 24V (32)

5.3.4.3 Location

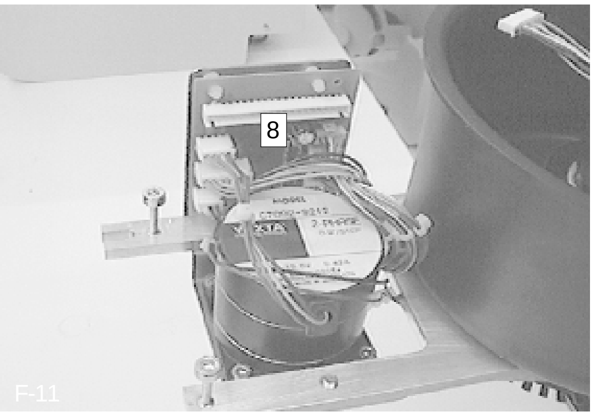


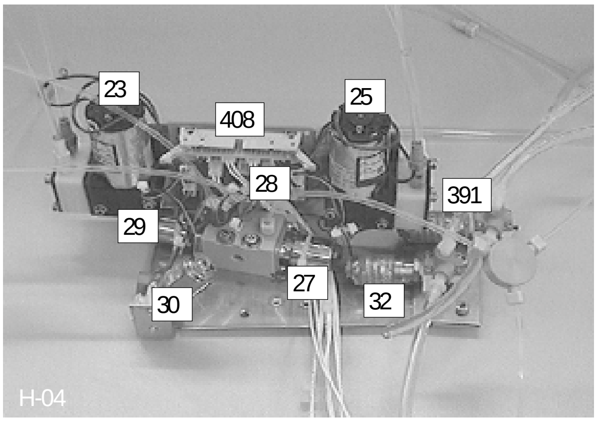


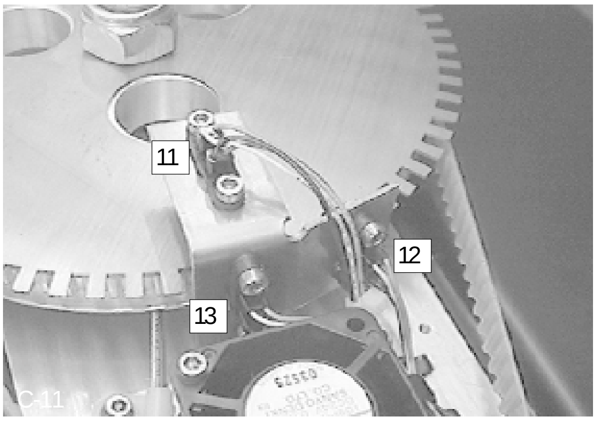


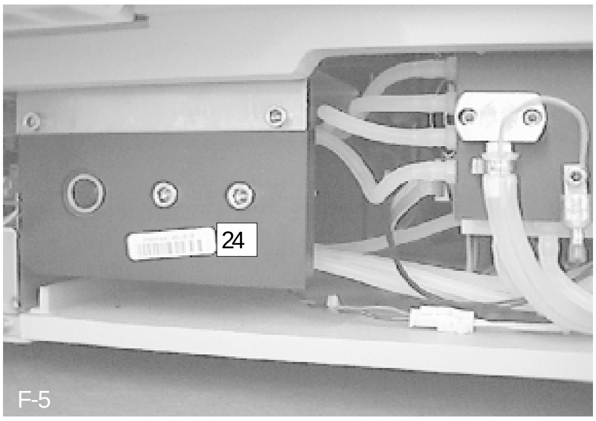


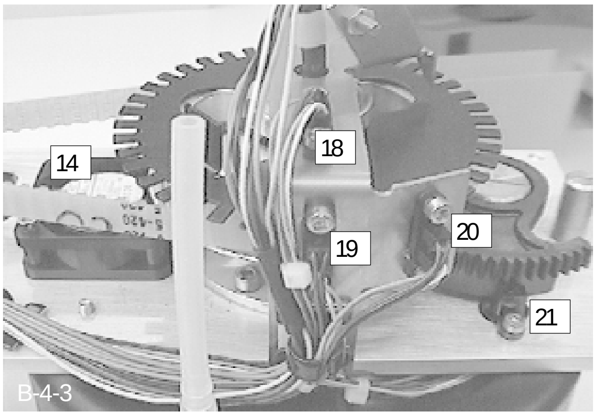
6	PCB Rotor/Rotor Module BP4
7	PCB Dist Rotor/Rotor S/R
8	PCB Dist Rotor/Rotor Incubator
10	SM S/R Drive
23	Membrane Pump PWD
25	Membrane Pump PWS
27	Magnet Valve 3-Way VWD1
28	Magnet Valve 3-Way VWD2
29	Magnet Valve 3-Way VWB1
30	Magnet Valve VWS1
32	Magnet Valve Assy VAD2
41	PCB Incubator Heater BP6
355	Cover Switch 2; Microswitch
391	Magnet Valve Assy VAB1
408	PCB Dist Fluid

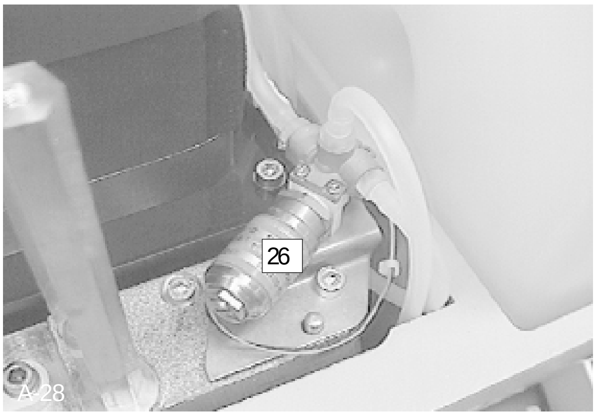


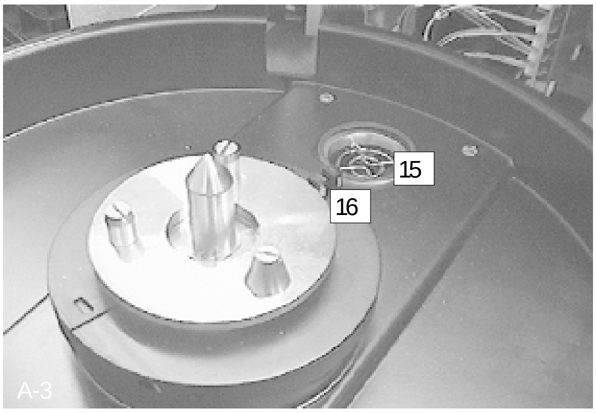

23
408
25
28
391
29
27
30
32
H-04

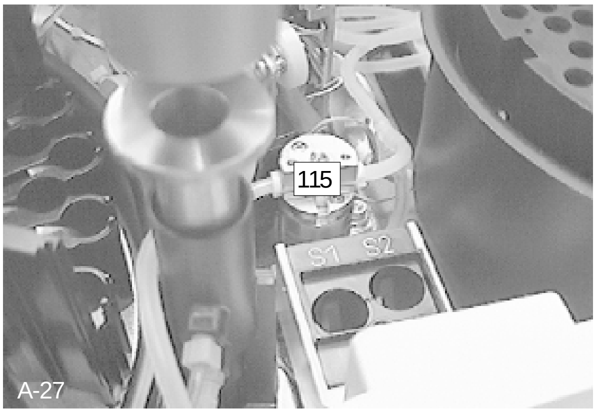


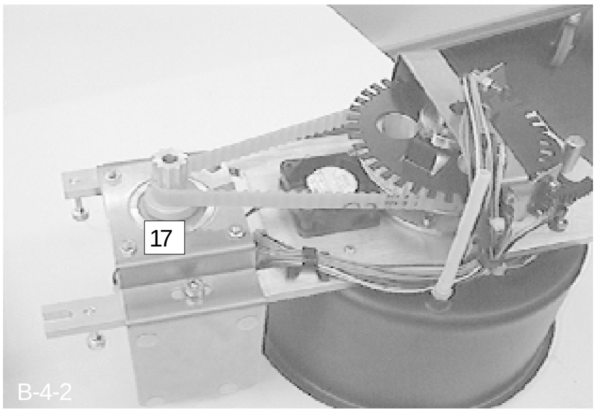



14
18
19
20
21
B-4-3

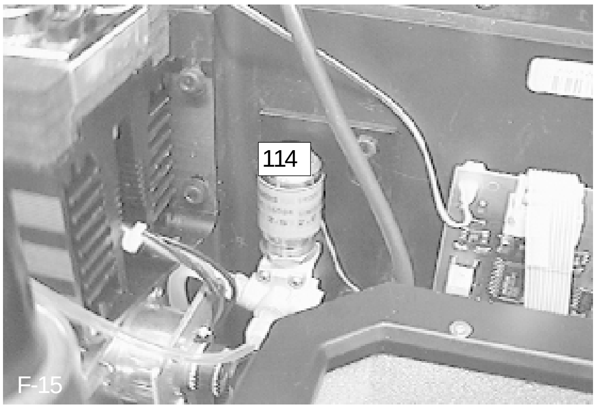





115
S1
S2
A-27



11	PhC S/R Drive Home
12	PhC S/R Drive Forward
13	PhC S/R Drive Reverse
14	Fan Assy S/R Drive
15	Fan Assy S/R Drive with Sensor
16	PhC S/R Tray Present
17	SM Incubator Drive
18	PhC Incubator Drive Home
19	PhC Incubator Drive Forward
20	PhC Incubator Drive Reverse
21	PhC Incubator Drive Position
24	Waste Pump
26	Magnet Valve VAS1
115	Magnet Valve VAD 1



114 Magnet Valve Assy VM1

5.3.4.4 Exchangeable Functional Units:

- PCB Rotor/Rotor Module BP4 (6)
- PCB Dist Rotor/Rotor S/R (7)
- PCB Dist Rotor/Rotor Incubator (8)
- SM S/R Drive (10)
- PhC S/R Drive Home (11)
- PhC S/R Drive Forward (12)
- PhC S/R Drive Reverse (13)
- Fan Assy S/R Drive (14)
- Fan Assy S/R Drive with Sensor (15)
- PhC S/R Tray Present (16)
- SM Incubator Drive (17)
- PhC Incubator Drive Home (18)
- PhC Incubator Drive Forward (19)
- PhC Incubator Drive Reverse (20)
- PhC Incubator Drive Position (21)
- Membrane Pump PWD (23)
- Waste Pump (24)
- Membrane Pump PWS (25)
- Magnet Valve VAS1 (26)
- Magnet Valve 3-Way VWD1 (27)
- Magnet Valve 3-Way VWD2 (28)
- Magnet Valve 3-Way VWB1 (29)
- Magnet Valve VWS1 (30)
- Magnet Valve Assy VAD2 (32)
- Magnet Valve Assy VM1 (114)
- Magnet Valve VAD 1 (115)
- Cover Switch 2; Microswitch (355)
- Magnet Valve Assy VAB1 (391)
- PCB Dist Fluid (408)

5.3.4.5 Functional Description

PCB Rotor/Rotor Module BP4 (6)

The PCB Rotor/Rotor Module BP4 carries all driver components.

The PCB Rotor/Rotor Module BP4 is mounted on the motherboard. All electrical connections such as supply and control lines to other components are connected to the BP via the motherboard. Except the CAN bus, no control lines are provided between the BPs.
After removal of the electronic rack cover, the BP can be pulled out of the rack to the front. The design of the electronic rack cover meets the EMC requirements. The motherboard and the components are connected with flat cables.

Controller PCB:

All BPs, such as PCB Rotor/Rotor Module BP4, have a Controller PCB. The hardware of all Controller PCBs is identical. The Controller PCB is horizontally connected to the BP via two multipoint connectors. All signal and supply lines are connected to the Controller PCB via the BP. 3 port lines are led to the BP and binary coded there for BP identification. The PCB Rotor/Rotor Module BP4 carries the number 4 (decimal).

E^2PROM:

The BP includes an E^2PROM and a control circuit to store data specific to the module.

Photo Couplers:

The photo couplers on the rotors are continuously supplied with current. GND and the supply of the Distributor PCBs are obtained from the motherboard. The photo coupler LEDs are supplied by the Distributor PCBs on the rotors. The photo couplers are provided with integrated Schmitt triggers.

Current Supply to the Base Print:

The current supply to the BPs is star-shaped and comes from the central voltage distribution (PCB Dist Voltage). The individual voltages are generated in the Power Supply Assy. The GND lines are joined together on the BP. The supply lines are protected on the Distributor PCB. Power lines are arranged parallel with GND return.

Voltage Supply:

Voltage	Tolerance	Current	Control Limits Lower Limit-Upper Limit +/-2%	Application
5.2V	+2% -2%	1 A		
GND		1 A		Digital GND
+15V	±5%	0.5 A	13.6-16.0 V	
GND		0.5 A		Analog GND
-15V	±5%	0.5 A		
24V	±10%	2 A	21.0-28.0 V	for Valves
GND		2 A		
35V	-10%,+15%	3 A	30.0 - 41.0 V	for SM
GND		3 A		

e-Tab532

The voltages + 15V, 24V and 35V are controlled by the module. If an error occurs, an error message will appear. Error: 3 inquiries at intervals of 1 second indicate that the value is above or below the values given above. The handling of the message is defined in the Communication and Control Software (KUST).

EMC/EMB Protection:

The connecting cables to the components are located in a shielded area of the housing.

Communication and Control Software (KUST):

The functions are controlled by the Communication and Control Software (KUST) Sipper. KUST is resident in the controller and can be downloaded.

CAN Bus:

The CAN bus lines CAN HIGH and CAN LOW are connected to the Controller PCB as stubs (i.e. as 2-pole) via the BP. The Controller on the BP is not designed as a terminal. An assembly position for a terminating resistance is provided on the Controller, however.

PCB Dist Rotor/Rotor S/R (7)

This distributor PCB connects the electrical components of the sample rotor (photo couplers, stepping motor and fan) to BP4 via cables and the motherboard.

PCB Dist Rotor/Rotor Incubator (8)

This distributor PCB connects the electrical components of the incubator rotor (photo couplers and stepping motors) to BP4 via cables and the motherboard.

PCB Dist Fluid (408)

The fluid distribution PCB connects the pumps PWD/PWS/waste as well as the valves VAS1/VWD1/VWD2/VWB1/VWS/VAD1/VAD2 to BP4 via cables and the motherboard.

SM S/R Drive (10)

The S/R drive stepping motor places the sample/reagent rotor in defined positions. The sample/reagent rotor is driven by a tooth belt at a 1:9.7 gear reduction. The rotation angle of the rotor is not limited. Step resolution is 0.9°.

PhC S/R Drive Home (11)

The S/R drive home sensor detects the home position of the sample/reagent rotor.

PhC S/R Drive Forward (12)

The S/R drive forward sensor controls and counts the pulses of a chopper disk during sample/reagent rotor rotation forward. At least 1 slope change occurs between each sample/reagent position.

PhC S/R Drive Reverse (13)

The S/R drive reverse sensor controls and counts the pulses of a chopper disk during sample/reagent rotor rotation backward. At least 1 slope change occurs between each sample/reagent position.

Fan Assy S/R Drive with Sensor (15)

The sensor on the Fan Assy S/R Drive monitors the function of the fan in the sample/reagent rotor.
The fan prevents heat accumulation in the sample area.

PhC S/R Tray Present (16)

The S/R tray present sensor detects if the sample/reagent rotor is present.

SM Incubator Drive (17)

The incubator drive stepping motor places the incubator rotor in defined positions. The incubator rotor is driven by a tooth belt at a 1:5 gear reduction. The maximum rotation angle of the rotor is approx. 400 °.

PhC Incubator Drive Home (18)

The incubator drive home sensor detects the home position of the incubator rotor.

PhC Incubator Drive Forward (19)

The incubator drive forward sensor controls and counts the pulses of a chopper disk during incubator rotor rotation forward. At least 1 slope change occurs between each incubation/bottle position.

PhC Incubator Drive Reverse (20)

The incubator drive reverse sensor controls and counts the pulses of a chopper disk during incubator rotor rotation forward. At least 1 slope change occurs between each sample/reagent position.

PhC Incubator Drive Position (21)

The incubator drive position sensor detects whether the rotor turns clockwise or counterclockwise. Limit stops prevent the rotor from exceeding the limits.

Fan Assy S/R Drive (14)

The S/R drive fan assy cools the stepping motor of the incubator rotor and prevents heat accumulation in the incubator area.

Membrane Pump PWD (23)

The membrane pump PWD transfers water from the distilled water bottle to the 3 wash stations WD1/WD2/WB1. It is located between distributor 2 and the valve block carrying the valves VWB1/VWD1/VWD2.

Waste Pump (24)

The waste pump is a peristaltic pump. It is driven by a 24V DC motor and has four (4) input/output connections to aspirate the waste liquids from the wash stations WD1, WD2, WB1, WS1.

Membrane Pump PWS (25)

The membrane pump PWS transfers water from the water bottle to the wash station sipper needle WS1. It is located between the Distributor PCB 2 and the valve VWS1.

Magnet Valve VAS1 (26)

The magnet valve VAS1 is located between the rinse and wash station WS1 (sipper needle) and the waste pump and controls the draining of water from wash station WS1.

Magnet Valve 3-Way VWD1 (27)

The magnet valve VWD1 controls the water supply to the wash station S/R needle WD1. It is located between the pump PWD and WD1.

Magnet Valve 3-Way VWD2 (28)

The magnet valve VWD2 controls the water supply to the wash station sipper needle WD2. It is located between the pump PWD and WD2.

Magnet Valve 3-Way VWB1 (29)

The magnet valve VWB1 controls the water supply to the wash station bead mixer WB1. It is located between the pump PWD and WB1.

Magnet Valve VWS1 (30)

The magnet valve VWS1 controls the water supply to the wash station sipper needle WS1. It is located between the pump PWS and WS1.

Magnet Valve Assy VAD2 (32)

The magnet valve VAD2 is located between the wash station WD2 (S/R needle) and the waste pump and controls the draining of water from wash station WD2.

Magnet Valve Assy VM1 (114)

The magnet valve assy VM1 is located between the cell and the waste/water distributor. It controls the draining of waste after cleaning of the cell via the waste/water distributor to the waste bottle.

Magnet Valve VAD 1 (115)

The magnet valve VAD1 is the only pinch valve in the system. It is located between the wash station WD1 (S/R needle) and the waste pump and controls the draining of water from wash station WD1.

Magnet Valve Assy VAB1 (391)

The magnet valve Assy VAB1 is located between the rinse and wash station WB1 (bead mixer) and the waste pump. It controls the draining of water from wash station WB1.

Cover Switch 2; Microswitch (355)

The microswitch signals the opening of the Elecsys 1010 cover while in operation. This is a safety feature that stops all movements in the instrument.

5.3.5 PCB Dilutor Reagent BP5 (76)

5.3.5.1 General Description

The PCB Dilutor Reagent BP5 controls the following functional units:

- PCB Dist MFA (385)
- PCB LLD S/R (78)
- PCB Preamp LLD S/R (79)
- SM Dilutor (237)
- PS Dilutor Home (423)
- SM Valve Dilutor (237)
- PS Dilutor Valve Home (211)
- Pump Sample Dilutor (235)

- by way of the PCB Dist MFA (385):

    - SM MFA Up/Down (384)
    - SM MFA Rotation (383)
    - HS MFA Home Up (405)
    - PhC MFA Home Rotation (247)
    - PhC MFA Rotation Forward (248)
    - PhC MFA Rotation Reverse (249)
    - PCB LLD S/R (78)

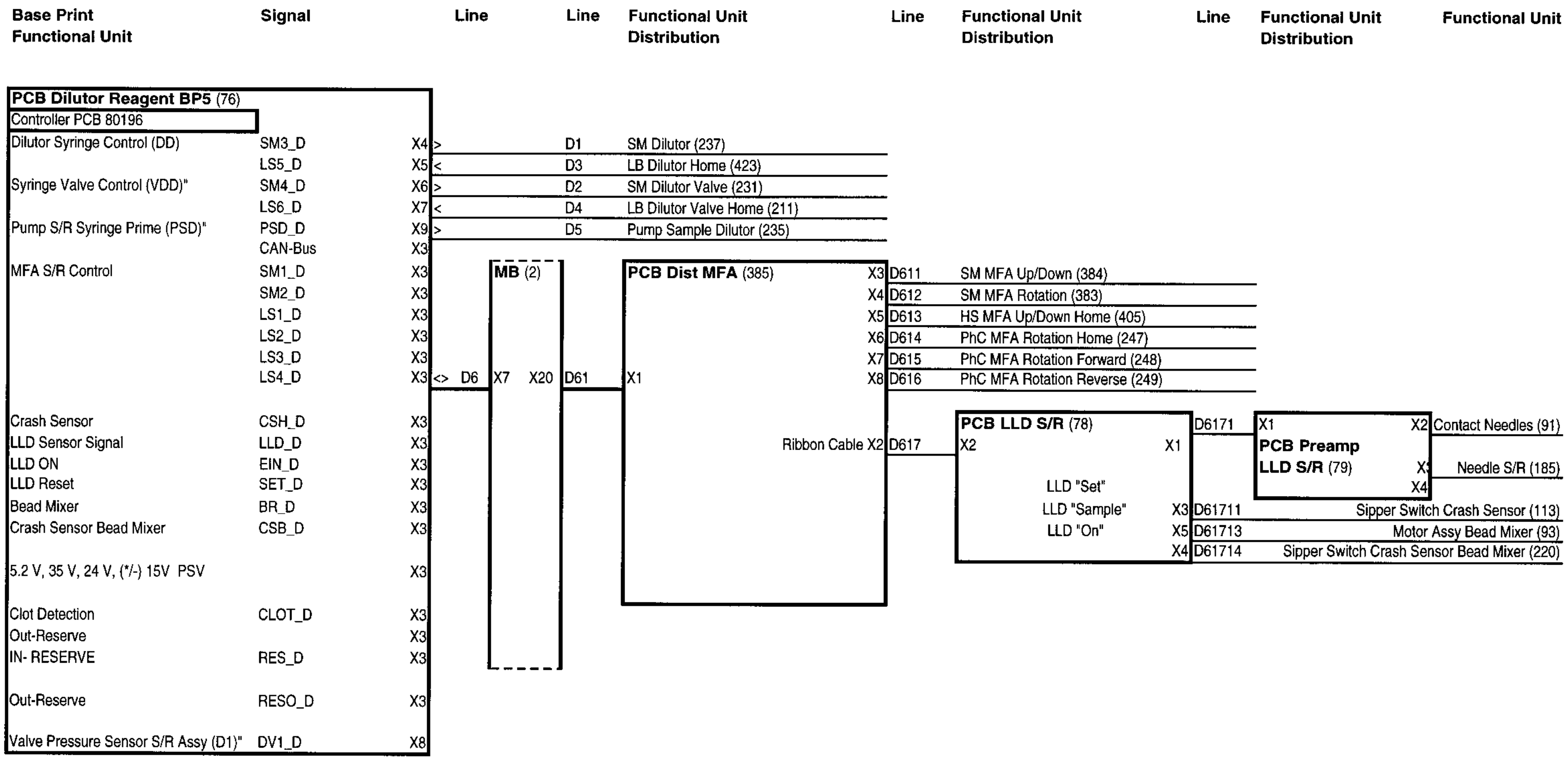
- by way of the PCB LLD S/R (78)

    - Sipper Switch Crash Needle (113)
    - Motor Assy Bead Mixer (93)
    - Sipper Switch Crash Sensor Bead Mixer (220)
    - PCB Preamp LLD S/R (79)

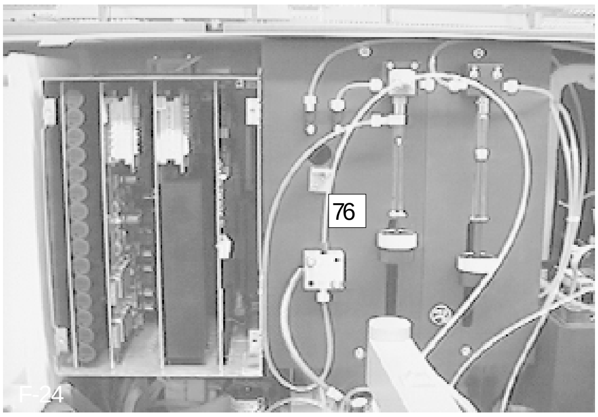
- by way of the PCB Preamp LLD S/R (79)

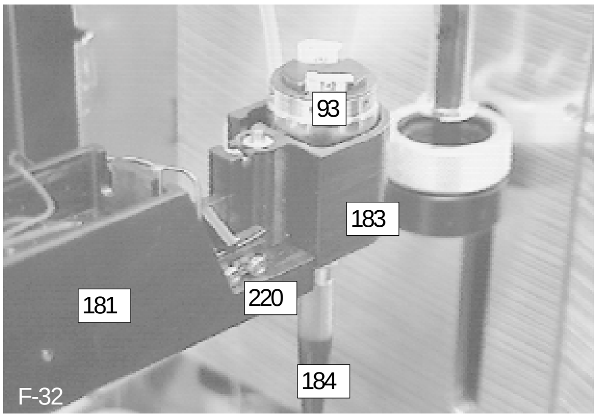
    - Contact Needle (91)
    - Needle S/R (185)

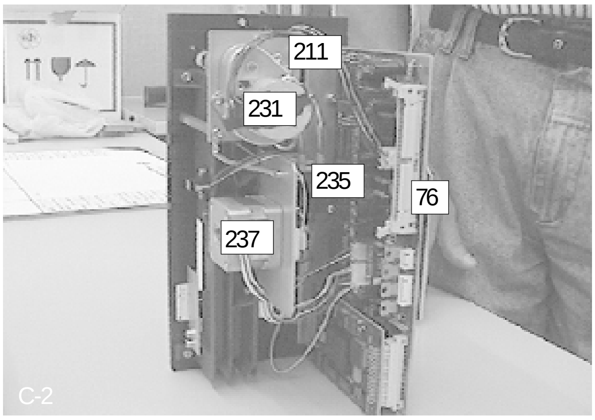
5.3.5.2 Block Diagram

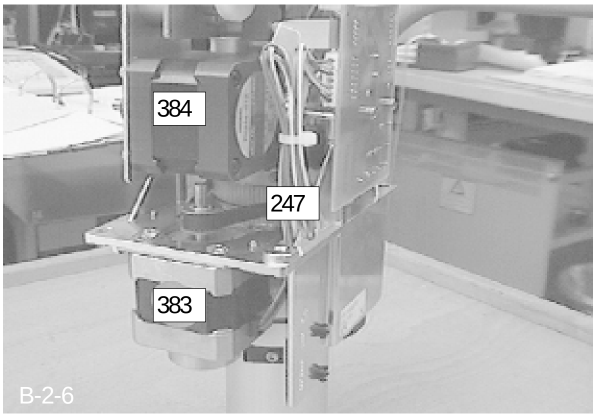

Base Print Functional Unit
Signal
Line
Line
Functional Unit Distribution
Line
Functional Unit Distribution
Line
Functional Unit Distribution
Functional Unit
PCB Dilutor Reagent BP5 (76)
Controller PCB 80196
Dilutor Syringe Control (DD) SM3_D X4 > D1 SM Dilutor (237)
LS5_D X5 < D3 LB Dilutor Home (423)
Syringe Valve Control (VDD)" SM4_D X6 > D2 SM Dilutor Valve (231)
LS6_D X7 < D4 LB Dilutor Valve Home (211)
Pump S/R Syringe Prime (PSD)" PSD_D X9 > D5 Pump Sample Dilutor (235)
CAN-Bus X3
MFA S/R Control SM1_D X3
SM2_D X3
LS1_D X3
LS2_D X3
LS3_D X3
LS4_D X3 <> D6
Crash Sensor CSH_D X3
LLD Sensor Signal LLD_D X3
LLD ON EIN_D X3
LLD Reset SET_D X3
Bead Mixer BR_D X3
Crash Sensor Bead Mixer CSB_D X3
5.2 V, 35 V, 24 V, (*/-) 15V PSV X3
Clot Detection CLOT_D X3
Out-Reserve X3
IN- RESERVE RES_D X3
Out-Reserve RESO_D X3
Valve Pressure Sensor S/R Assy (D1)" DV1_D X8
MB (2)
X7 X20 D61
PCB Dist MFA (385)
X1
X3 D611 SM MFA Up/Down (384)
X4 D612 SM MFA Rotation (383)
X5 D613 HS MFA Up/Down Home (405)
X6 D614 PhC MFA Rotation Home (247)
X7 D615 PhC MFA Rotation Forward (248)
X8 D616 PhC MFA Rotation Reverse (249)
Ribbon Cable X2 D617
PCB LLD S/R (78)
X2
X1 D6171
LLD "Set"
LLD "Sample"
LLD "On"
X3 D61711 Sipper Switch Crash Sensor (113)
X5 D61713 Motor Assy Bead Mixer (93)
X4 D61714 Sipper Switch Crash Sensor Bead Mixer (220)
X1
PCB Preamp LLD S/R (79)
X2 Contact Needles (91)
X3 Needle S/R (185)
X4

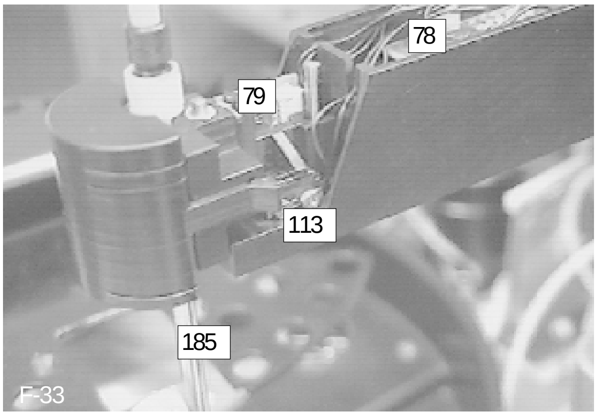
5.3.5.3 Location

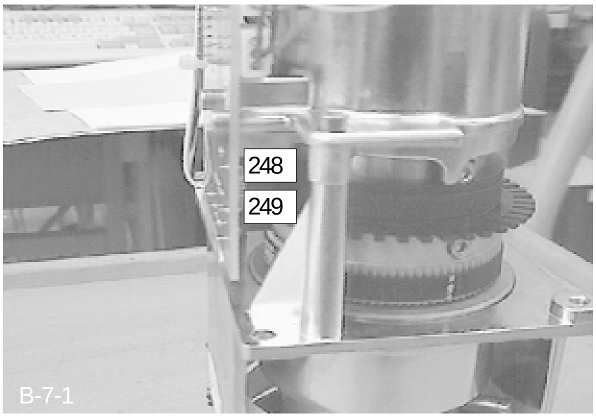


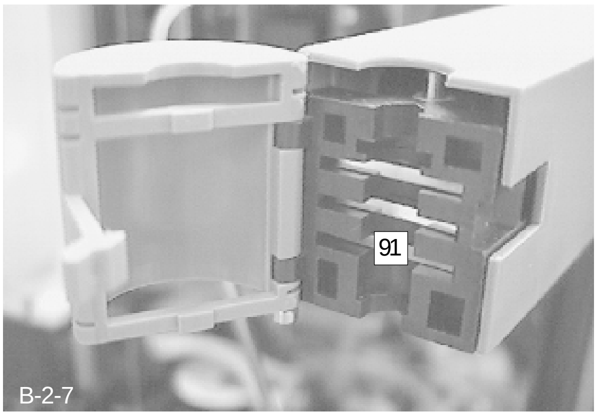

93
183
181
220
184
F-32


211
231
235
76
237
C-2

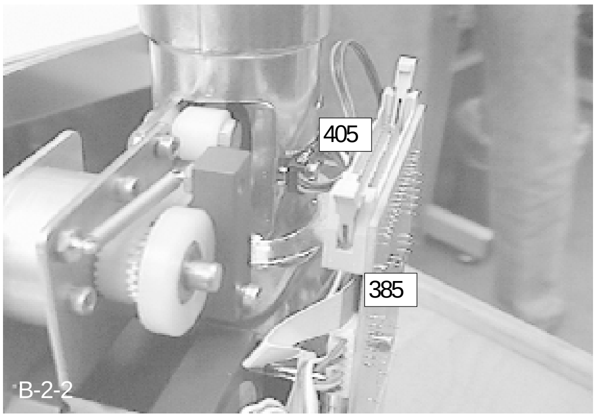

384
247
383
B-2-6

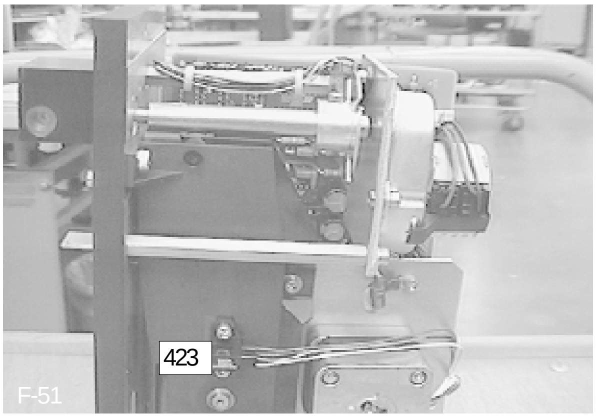

78
79
113
185
F-33





76	PCB Dilutor Reagent BP5
78	PCB LLD S/R
79	PCB Preamp LLD S/R
91	Contact Needle
93	Motor Assy Bead Mixer
113	Sipper Switch Crash Needle
185	Needle S/R
211	LB Dilutor Valve Home
220	Sipper Switch Crash Sensor Bead Mixer
231	SM Valve Dilutor
235	Pump Sample Dilutor
237	SM Dilutor
247	PhC MFA Home Rotation
248	PhC MFA Rotation Forward
249	PhC MFA Rotation Reverse
383	SM MFA Rotation
384	SM MFA Up/Down





385 PCB Dist MFA
405 HS MFA Home Up
423 LB Dilutor Home

5.3.5.4. Exchangeable Functional Units:

- PCB Dilutor Reagent BP5 (76)
- PCB LLD S/R (78)
- PCB Preamp LLD S/R (79)
- Contact Needle (91)
- Motor Assy Bead Mixer (93)
- Sipper Switch Crash Needle (113)
- Needle S/R (185)
- LB Dilutor Valve Home (211)
- Sipper Switch Crash Sensor Bead Mixer (220)
- SM Valve Dilutor (231)
- Pump Sample Dilutor (235)
- SM Dilutor (237)
- SM MFA Rotation (383)
- SM MFA Up/Down (384)
- PCB Dist MFA (385)
- HS MFA Home Up (405)
- LB Dilutor Home (423)

5.3.5.5 Functional Description

PCB Dilutor Reagent BP5 (76)

The PCB Dilutor Reagent BP5 carries all driver components. The PCB Dilutor Reagent BP5 is integrated in the dilutor/ waste station pump assy. The whole assembly can be removed from the instrument to the front. The dilutor assembly is enclosed by a metal box (rack) that ensures compliance with the EMC requirements. The front plate and the box are connected to the basic frame of Elecsys 1010 to meet HF requirements. The MFA S/R system is connected to the BP or the motherboard via a cable. A Distributor PCB on the MFA redistributes the connections. The connections may be plugged on BP5 and the Distributor PCB.

MFA Wiring:

The wiring is part of the MFAs. The LLD bead mixer and crash sensor lines are connected through the center of the MFA shaft by means of a flexible cable. They are connected to the PCB Dist MFA and the MFA and may be disconnected.

Controller PCB:

All BPs, such as PCB Dilutor Reagent BP5, have a Controller PCB. The hardware of all Controller PCBs is identical. The Controller PCB is horizontally connected to the BP via two multipoint connectors. All signal and supply lines are connected to the Controller PCB via the BP. 3 port lines are led to the BP and binary coded there for BP identification. The PCB Dilutor Reagent BP5 carries the number 5 (decimal).

E^{2}PROM:

The BP includes an E^{2}PROM and a control circuit to store data specific to the module.

Photo Couplers:

The photo couplers are continuously supplied with current.

Plug-and-Socket Connectors:

The plugs are continuously numbered X1 thru X5 on the component assembly. The BP is connected to the motherboard (X3) via a 60 pole (2*30) connector with a locking device for vertical mounting including a protection against wiring in opposition direction.

Voltage Supply to the Base Print:

The voltage supply to the BPs is star-shaped and comes from the central voltage distribution (PCB Dist Voltage). The individual voltages are generated in the Power Supply Assy. The GND lines are joined together on the BP. The supply lines are protected on the Distributor PCB. Power lines are arranged parallel with GND return. The supply lines are connected from the motherboard via a flat cable and plug X6. At high loads, contacts are switched parallel. Except the high and low lines of the CAN bus, there are no supply line connections between the individual BPs. The supply voltages are divided accordingly and applied to the AD-C of the controller.

Voltage Supply:

Voltage	Tolerance	Current	Control Limits Lower Limit-Upper Limit +/-2%	Application
5.2V	+2% -2%	1 A		
GND		1 A		Digital GND
+15V	±5%	0.5 A	13.6-16.0 V	
GND		0.5 A		Analog GND
-15V	±5%	0.5 A		
24V	±10%	2 A	21.0-28.0 V	for Valves
GND		2 A		
35V	+15%,-10%	3 A	30.0 - 41.0 V	for SM
GND		3 A		

e-Tab533

The voltages + 15V, 24V and 35V are controlled by the module. If an error occurs, an error message will appear. Error: 3 inquiries at intervals of 1 second indicate that the value is above or below the values given above. The handling of the message is defined in the Communication and Control Software (KUST).

EMC/EMB Protection:

The connecting cable to the motherboard (flat cable) is placed flat on the housing of the metal box (main ground) by means of a metal sheet to ensure a capacitive uncoupling of ground faults.

Communication and Control Software (KUST):

The functions are controlled by the Communication and Control Software (KUST) Sipper. KUST is resident in the controller and can be downloaded.

CAN Bus:

The CAN bus lines CAN HIGH and CAN LOW are looped on the BP and connected to the Controller PCB as stubs. That means, 2*CAN-IN and 2*CAN-Out lines are applied to plug X3. The BP is not designed as a terminal. An assembly position for a terminating resistance is provided on the controller, however.

Clot Detection:

The signal "overpressure on transducer" (active when current flows) is transmitted by the peripherals to BP5 via the optocoupler. Further signals or supply voltages are neglected. Once the signal "overpressure on transducer" appears, KUST will respond within <10 ms and stop the dilutor stepping motor at the quickest ramp response. The corresponding message is transferred to the OEM Master.

PCB LLD S/R (78)

The sample/reagent arm of ELECSYS 1010 is provided with an LLD (Liquid Level Detection). The LLD consists of the triaxial (3 tubes) pipettor needle and the PCB LLD S/R. The LLD evaluation circuit is located on the PCB directly behind the needle holder. The functioning of the LLD is based on the fact that the output voltage of an oscillator drops below a threshold value once the LLD reaches the level of the liquid. This voltage drop is transmitted to a PCB. The oscillator frequency is at approx. 30 kHz. In the PCB LLD S/R circuit the signal received from the PCB Preamp LLD S/R is processed, digitized and finally transmitted to the controller of BP5. On the sample/reagent arm, the PCB LLD S/R detects the liquid level both in the sample and/or reagent containers and packs.

PCB Preamp LLD S/R (79)

The signal received from the triaxial needle is amplified in the PCB Preamp LLD S/R and transmitted to the PCB LLD S/R.

Contact Needle (91)

The contact needles establish the electrical connections from the triaxial needle to the PCB Preamp LLD S/R. These 3 contact needles connect the detection electrode, reference electrode and screen electrode with the PCB Preamp LLD S/R.

Motor Assy Bead Mixer (93)

The bead mixer motor assy is located on the bead mixer. It directly drives the bead mixer. The mixer ensures a homogeneous distribution of the beads.

Sipper Switch Crash Needle (113)

The sipper switch indicates when the triaxial needle is obstructed during the horizontal downward movement.

Needle S/R (185)

The S/R needle is located on the sample/reagent arm and aspirates samples, reagents and beads.

LB Dilutor Valve Home (211)

The dilutor photosensor checks the dilutor position.

Sipper Switch Crash Sensor Bead Mixer (220)

The sipper switch detects when the triaxial needle is obstructed during the horizontal downward movement.

SM Valve Dilutor (231)

This dilutor valve stepping motor drives the VVD valve in the full-step mode.

Pump Sample Dilutor (235)

The sample dilutor pump is used only for priming the syringe and needle. It pumps water directly through the S/R needle. It is linked to the syringe via the valve VDD.

SM Dilutor (237)

The dilutor stepping motor drives the piston of the dilutor in the micro-step mode via a gear.

PhC MFA Home Rotation (247)

The photo coupler detects the home position of the S/R arm in the direction of rotation. It is located in the middle of the travel way. When overtraveling this position, the counter is set to zero, thus gaining a mechanical reference position.

PhC MFA Rotation Forward (248)

The MFA rotation/forward and MFA rotation/reverse sensors monitor the direction of rotation forwards or backwards. By relocating the photo couplers (90°), the direction of rotation can be detected via the slopes of the chopper disk. The signals are evaluated by the software of the BP5 controller.

PhC MFA Rotation Reverse (249)

The MFA rotation/reverse and MFA rotation/forward sensors monitor the direction of rotation forwards or backwards. By relocating the photo couplers (90°), the direction of rotation can be detected via the slopes of the chopper disk. The signals are evaluated by the software of the BP5 controller.

SM MFA Rotation (383)

The MFA rotation stepping motor effects the rotational movement of the sample/reagent arm.

SM MFA Up/Down (384)

The MFA up/down stepping motor effects the vertical movement of the sample/reagent arm.

PCB Dist MFA (385)

The MFA distributor PCB connects the stepping motors, photo couplers and sensors of the sample/reagent MFA with BP5. The connections are connected via cable and the motherboard.

HS MFA Home Up (405)

The MFA home up sensor is located in the middle of the travel way. When overtraveling this position, the counter is set to zero, thus gaining a mechanical reference position.

LB Dilutor Home (423)

The dilutor home sensor monitors the home position of the dilutor stepping motor.

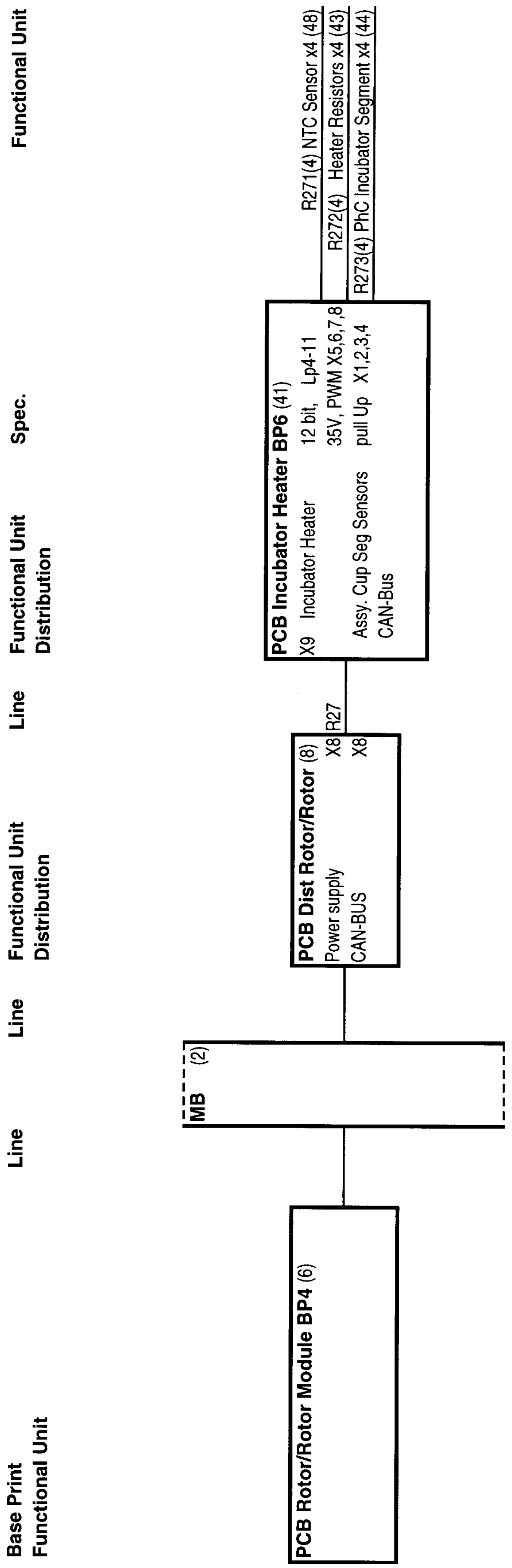
5.3.6 PCB Incubator Heater BP6 (41)

5.3.6.1 General Description

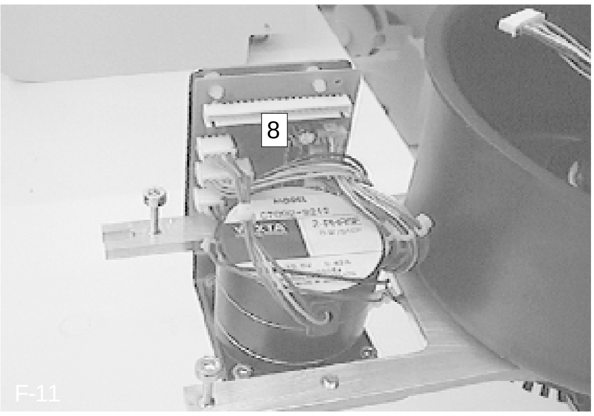
The PCB Incubator Heater BP6 is connected to the PCB Dist Rotor/Rotor (8) and controls the following functional units:

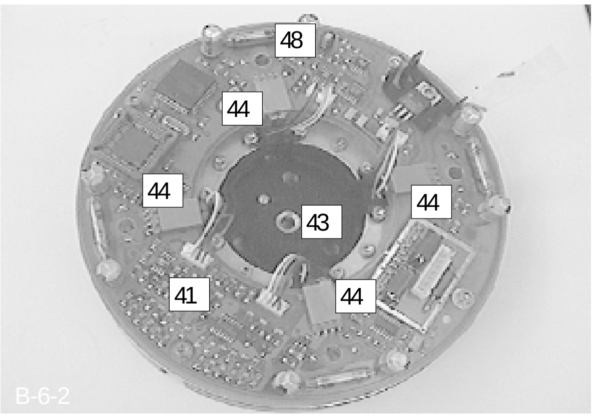
- NTC Sensor (48)
- Heater Resistors (43)
- PhC Incubator Segment (44)

5.3.6.2 Block Diagram


Base Print
Functional Unit
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Spec.
Functional Unit
PCB Rotor/Rotor Module BP4 (6)
MB (2)
PCB Dist Rotor/Rotor (8)
Power supply X8
CAN-BUS X8
R27
PCB Incubator Heater BP6 (41)
X9 Incubator Heater 12 bit, Lp4-11
35V, PWM X5,6,7,8
Assy. Cup Seg Sensors pull Up X1,2,3,4
CAN-Bus
R271(4) NTC Sensor x4 (48)
R272(4) Heater Resistors x4 (43)
R273(4) PhC Incubator Segment x4 (44)

5.3.6.3 Location





8	PCB Dist Rotor/Rotor
41	PCB Incubator Heater BP6
44	PhC Incubator Segment
48	NTC Sensor
43	Heater Resistor

5.3.6.4 Exchangeable Functional Units:

- PhC Incubator Segment (44)

5.3.6.5 Functional Description

PCB Incubator Heater BP6 (41)

The incubator heater heats the incubate in the vessels. The required temperature of 37 °C is reached and maintained by means of flexible heater bands and NTC sensors.

Photo couplers detect which vessel segments are inserted in the incubator rotor.

NTC Sensor (48)

These sensors (4) are recessed in the aluminum body and detect the actual temperature. They determine the accuracy of this control circuit.

Heater Resistors (43)

The heater resistors (4) are the control elements for maintaining the vessels at 37 °C. They are connected to BP6 and are placed in a foil between a cover and the aluminum body.

PhC Incubator Segment (44)

The photo couplers (4) detect whether the vessel segments are present. The vessel segments have a lug that interrupts the photo couplers when the segments are placed in the incubator rotor from above. For testing purposes, the photo couplers may be interrupted by means of a tool (e.g. screw driver).

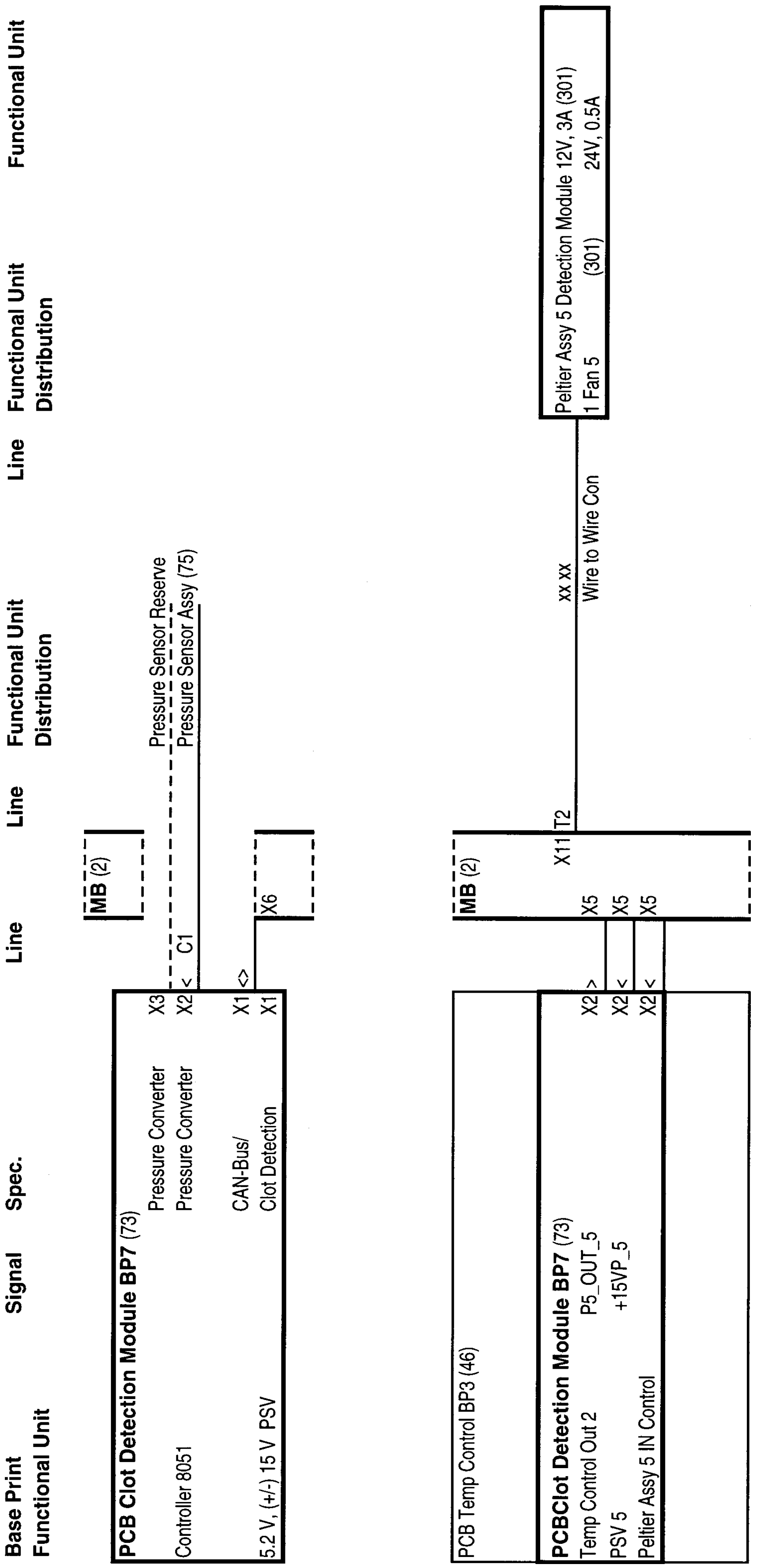
5.3.7 PCB Clot Detection Module BP7 (73)

5.3.7.1 General Description

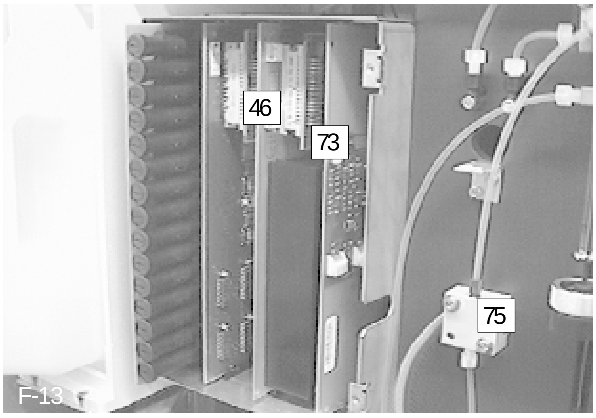
The PCB Clot Detection Module BP7 is divided for structural reasons; one part is located on BP 3. It contains in addition the driver circuit for the Peltier Assy 5 Detection Module on the detection module.
The PCB Clot Detection Module BP7 controls the following functional units:

- Pressure Sensor Assy (75)

5.3.7.2 Block Diagram


Base Print
Functional Unit
Signal
Spec.
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Functional Unit
PCB Clot Detection Module BP7 (73)
Controller 8051
Pressure Converter
Pressure Converter
X3
X2
5.2 V, (+/-) 15 V PSV
CAN-Bus/
Clot Detection
X1
X1
<
<>
C1
MB (2)
X6
Pressure Sensor Reserve
Pressure Sensor Assy (75)
PCB Temp Control BP3 (46)
PCBClot Detection Module BP7 (73)
Temp Control Out 2
P5_OUT_5
PSV 5
+15VP_5
Peltier Assy 5 IN Control
X2
X2
X2
>
<
<
MB (2)
X5
X5
X5
X11
T2
xx xx
Wire to Wire Con
Peltier Assy 5 Detection Module 12V, 3A (301)
1 Fan 5
(301)
24V, 0.5A

5.3.7.3 Location



46 PCB Temp Module BP3
73 PCB Clot Detection Module BP7
75 Pressure Sensor Assy

5.3.7.4 Exchangeable Functional Units:

- PCB Clot Detection Module BP7 (73)
- Pressure Sensor Assy (75)

5.3.7.5 Functional Description

PCB Clot Detection Module BP7 (73)

The PCB Clot Detection Module BP7 detects if the needle is completely or partially obstructed. Influences, such as sudden pressure changes, major temperature fluctuations, air pressure, etc., that are related to the operation of the instrument, will be compensated. BP7 will independently assess such events and transmit the information to the higher-ranking KUST (Communication and Control Software), which will then initiate a special cleaning cycle.

In addition, BP7 carries the driver output stage for the Peltier assy of the detection module.

Pressure Sensor Assy (75)

The pressure sensor assy is located at the front of the S/R module. The pressure signal is amplified, digitized and filtered. The signal is traced and evaluated by the controller. In the event of deviations in the typical pressure profile between S/R needle and dilutor, the pressure sensor assy indicates clots (signal: "overpressure on transducer"). This signal will be active under current flow.

Once the signal "overpressure on transducer" appears, KUST will respond within <10 ms and stop the dilutor stepping motor at the quickest ramp response. The corresponding message is transferred to the OEM Master.

It is possible to detect clots of a firm or elastic consistency as well as partial obstructions in the system.

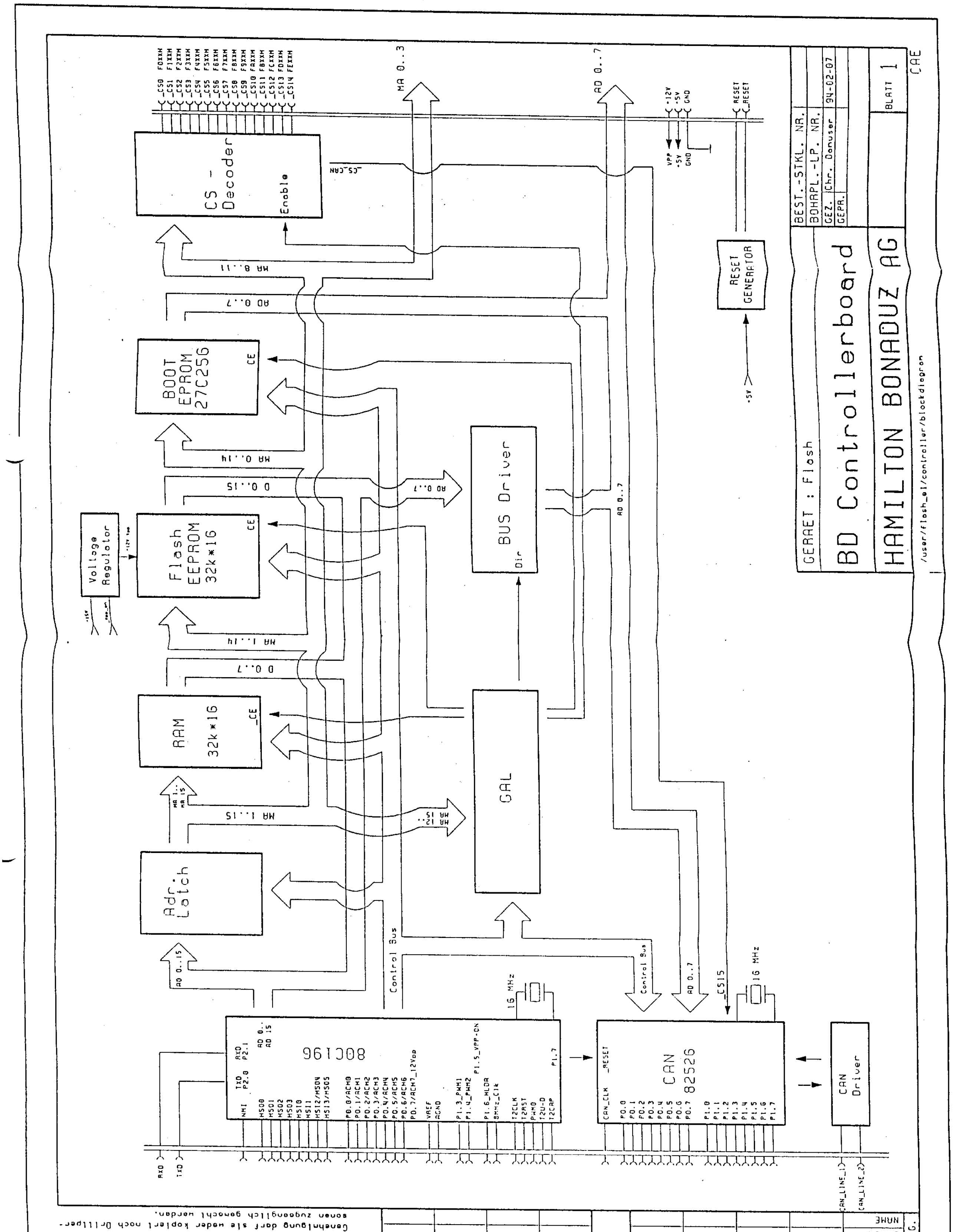
5.3.8 PCB Controller (400)

5.3.8.1 General Description

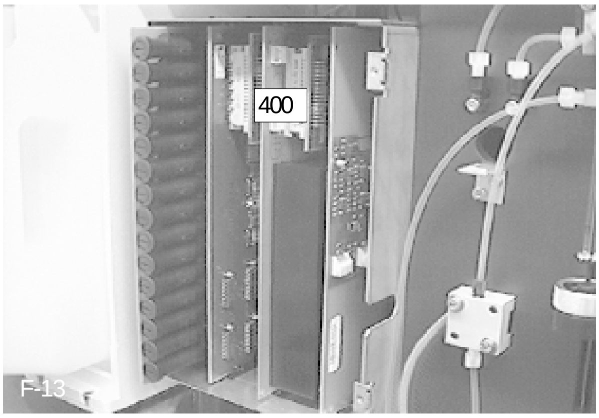
The PCB Controller 80196 (400) is mounted on the following base prints:

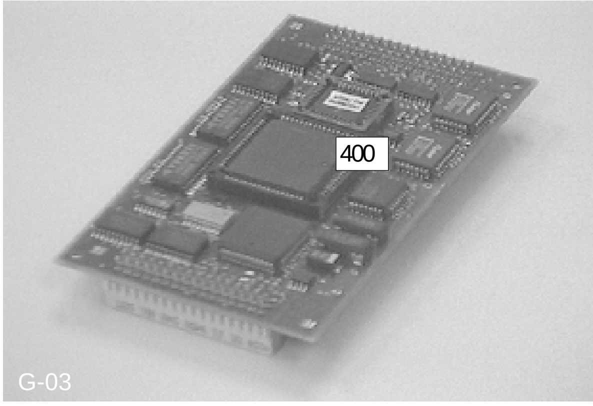
- PCB Detection Module BP1
- PCB Dilutor Sample BP2
- PCB Temp Module BP3
- PCB Rotor/Rotor Module BP4
- PCB Dilutor Reagent BP5

5.3.8.2 Block Diagram


Adr. Latch
RAM 32k*16
_CE
Flash EEPROM 32k*16
CE
BOOT EPROM 27C256
CE
CS - Decoder
Enable
Voltage Regulator
+12V Vpp
GAL
BUS Driver
Dir
80C196
CAN 82526
CAN Driver
RESET GENERATOR
+5V
AD 0..15
MA 1..15
MA 12.. MA 15
MA 1.. MA 15
D 0..7
MA 1..14
D 0..15
AD 0..7
MA 0..14
MA 8..11
MA 0..3
_CS_CAN
Control Bus
_CS15
16 MHz
RXD
TXD
NMI
TXD P2.0
RXD P2.1
AD 0.. AD 15
HS00
HS01
HS02
HS03
HS10
HS11
HS12/HS04
HS13/HS05
P0.0/ACH0
P0.1/ACH1
P0.2/ACH2
P0.3/ACH3
P0.4/ACH4
P0.5/ACH5
P0.6/ACH6
P0.7/ACH7_12Vpp
VREF
AGND
P1.3_PWM1
P1.4_PWM2
P1.5_VPP-ON
P1.6_HLDA
8MHz_Clk
T2CLK
T2RST
PWM0
T2U-D
T2CAP
P1.7
CAN_CLK
_RESET
P0.0
P0.1
P0.2
P0.3
P0.4
P0.5
P0.6
P0.7
P1.0
P1.1
P1.2
P1.3
P1.4
P1.5
P1.6
P1.7
CAN_LINE_1
CAN_LINE_2
_CS0 F0XXH
_CS1 F1XXH
_CS2 F2XXH
_CS3 F3XXH
_CS4 F4XXH
_CS5 F5XXH
_CS6 F6XXH
_CS7 F7XXH
_CS8 F8XXH
_CS9 F9XXH
_CS10 FAXXH
_CS11 FBXXH
_CS12 FCXXH
_CS13 FDXXH
_CS14 FEXXH
VPP
+5V
GND
+12V
+5V
GND
RESET
_RESET
GERAET : Flash
BD Controllerboard
HAMILTON BONADUZ AG
BEST.-STKL. NR.
BOHRPL.-LP. NR.
GEZ. Chr. Danuser 94-02-07
GEPR.
BLATT 1
CAE
/user/flash_el/controller/blockdiagram
REVISION
AEND.NR.
DATUM
NAME
AENDERG.
Diese Zeichnung gilt als den jeweiligen Inhaber persoenlich anvertraut. Das Eigentum und das Urheberrecht verbleibt der Firma. Ohne schriftliche Genehmigung darf sie weder kopiert noch Drittpersonen zugaenglich gemacht werden.

5.3.8.3 Location





400 PCB Controller

5.3.8.4 Exchangeable Functional Units:

- PCB Controller (400)

5.3.8.5 Functional Description

The controller PCBs are mounted on the PCB Detection Module BP1, PCB Dilutor Sample BP2, PCB Temp Module BP3, PCB Rotor/Rotor Module BP4 and PCB Dilutor Reagent BP5. The controller PCB controls these BPs using the specific KUST software. The hardware of any of these controller PCBs is identical. They receive their specific identification by means of a code on the BP after assembly and are downloaded by the OEM Master (industrial PC) in the event of a software intialization via the specific KUST software. The controller will write or read any data specific to the BP to or from an E^2PROM, which is located on the individual BP, via a serial connection. All electrical connections are established by means of two 48pin ribbon connectors via the BP. No other input or output lines are used.

5.3.9 PCB OEM Master (129)

The OEM Master PCB is connected to the power supply assy and to the voltage distribution.
The OEM Master controls the following functional units:

- BCR Assy (125)
- Printer (126)
- Floppy Disk Drive (127)
- PCB Dist Keyboard (53)

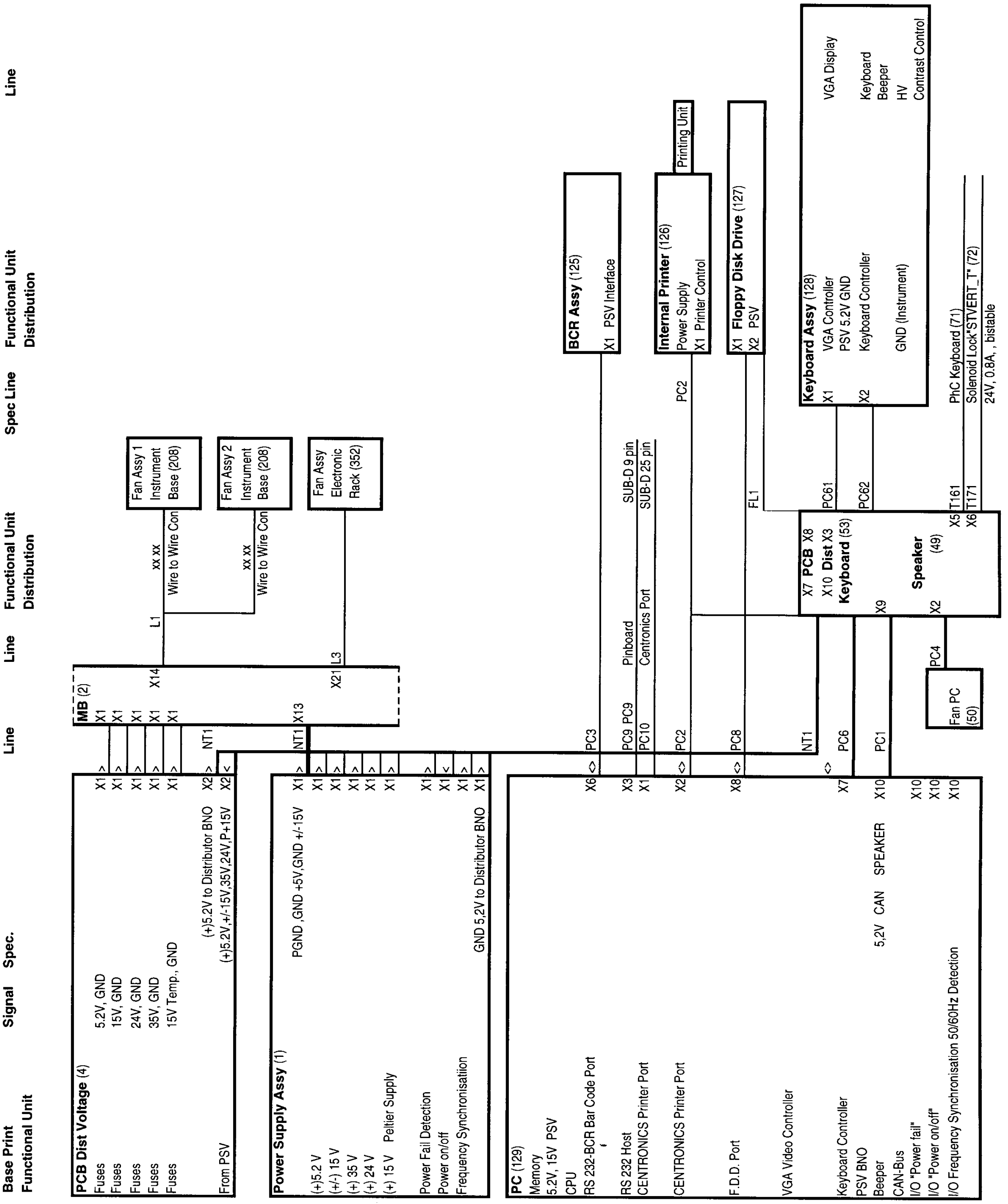
- by way of the PCB Dist Keyboard (53), on which there is a speaker:

  - Keyboard Assy (128)
  - PhC Keyboard (71)
  - Magnet Keyboard (72)
  - Fan PC (50)

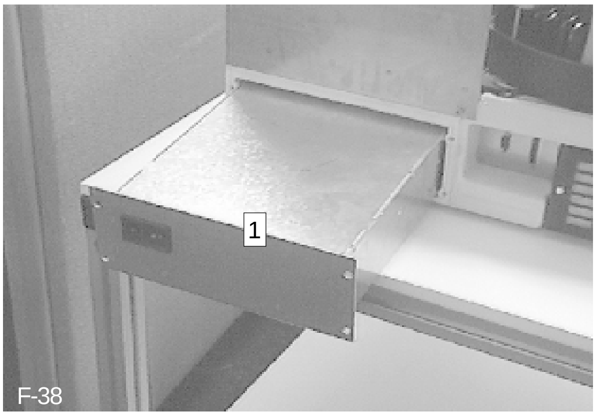
The following units are connected to the voltage distribution:

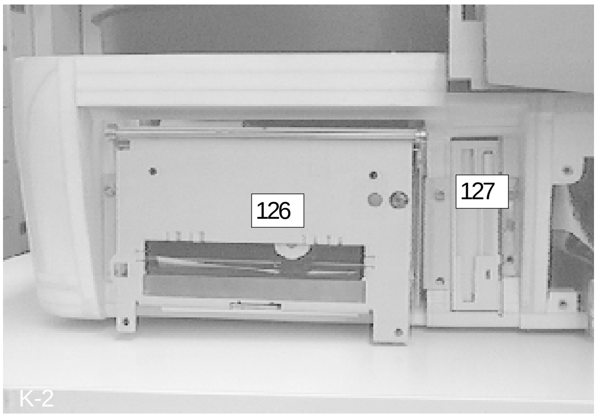
- Fan Assy 1 Instrument Base (208)
- Fan Assy 2 Instrument Base (208)
- Fan Assy Electronic Rack (352)

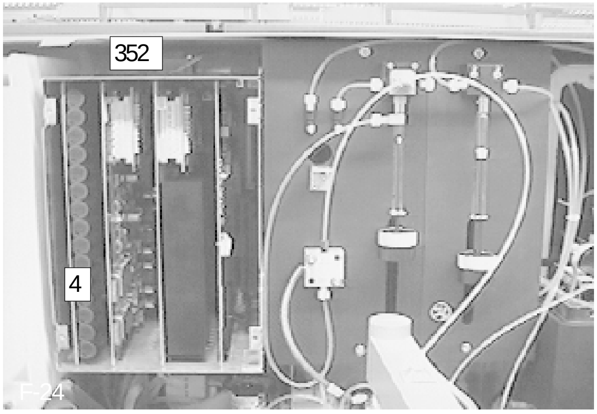
5.3.9.2 Block Diagram

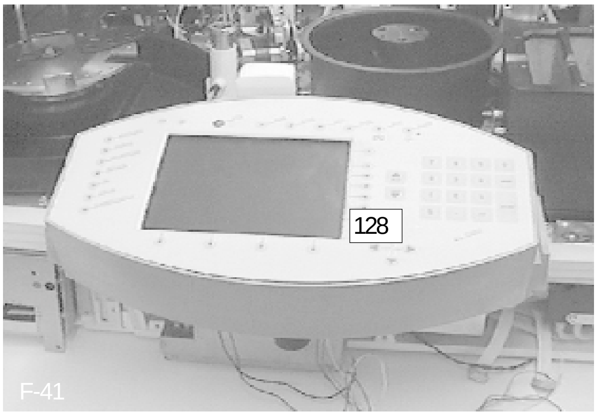

Base Print
Functional Unit
Signal
Spec.
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Spec Line
Functional Unit
Distribution
Line
PCB Dist Voltage (4)
Fuses 5.2V, GND X1
Fuses 15V, GND X1
Fuses 24V, GND X1
Fuses 35V, GND X1
Fuses 15V Temp., GND X1
(+)5.2V to Distributor BNO X2
From PSV (+)5.2V,+/-15V,35V,24V,P+15V X2
Power Supply Assy (1)
PGND ,GND +5V,GND +/-15V X1
(+)5.2 V X1
(+/-) 15 V X1
(+) 35 V X1
(+) 24 V X1
(+) 15 V Peltier Supply X1
Power Fail Detection X1
Power on/off X1
Frequency Synchronisatiion X1
GND 5,2V to Distributor BNO X1
PC (129)
Memory
5.2V, 15V PSV
CPU
RS 232-BCR Bar Code Port X6
RS 232 Host X3
CENTRONICS Printer Port X1
CENTRONICS Printer Port X2
F.D.D. Port X8
VGA Video Controller
Keyboard Controller X7
PSV BNO 5,2V CAN SPEAKER X10
Beeper X10
CAN-Bus X10
I/O "Power fail" X10
I/O "Power on/off"
I/O Frequency Synchronisation 50/60Hz Detection
NT1
NT1
MB (2)
X1
X1
X1
X1
X1
X13
X14
X21
L1
L3
xx xx
Wire to Wire Con
Fan Assy 1 Instrument Base (208)
Fan Assy 2 Instrument Base (208)
Fan Assy Electronic Rack (352)
PC3
PC9 PC9
PC10
PC2
PC8
NT1
PC6
PC1
Pinboard
Centronics Port
SUB-D 9 pin
SUB-D 25 pin
PC2
FL1
BCR Assy (125)
X1 PSV Interface
Internal Printer (126)
Power Supply
X1 Printer Control
Printing Unit
X1 Floppy Disk Drive (127)
X2 PSV
X7 PCB X8
X10 Dist X3
Keyboard (53)
X9
X2
Speaker (49)
X5 T161
X6 T171
PC61
PC62
PC4
Fan PC (50)
Keyboard Assy (128)
X1 VGA Controller
PSV 5.2V GND
X2 Keyboard Controller
GND (Instrument)
VGA Display
Keyboard
Beeper
HV
Contrast Control
PhC Keyboard (71)
Solenoid Lock"STVERT_T" (72)
24V, 0.8A, , bistable

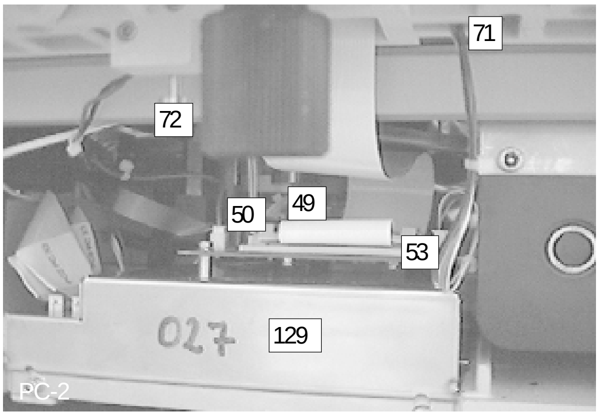
5.3.9.3 Location

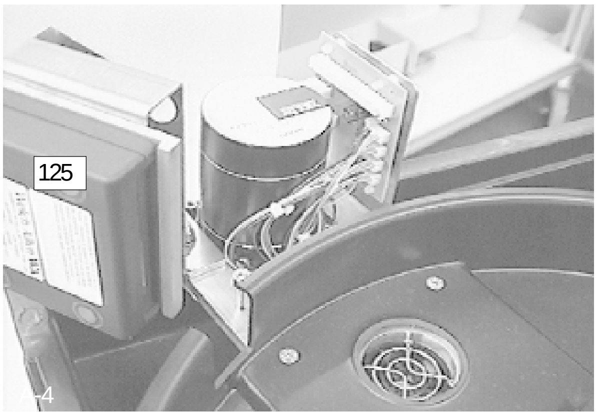


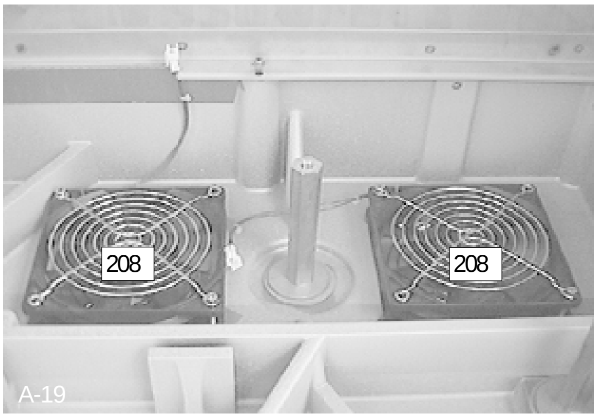







71
72
50
49
53
027
129
PC-2





1	Power Supply Assy
4	PCB Dist Voltage
49	Speaker
50	Fan PC
53	PCB Dist Keyboard
71	PhC Keyboard
72	Magnet Keyboard
125	BCR Assy
126	Printer
127	Floppy Disk Drive
128	Keyboard Assy
129	PC
208	Fan Assy 1 Instrument Base, identical with Fan Assy 2 Instrument Base
352	Fan Assy Electronic Rack

5.3.9.4 Exchangeable Functional Units:

- Power Supply Assy (1)
- PCB Dist Voltage (4)
- PCB Dist Keyboard (53)
- PhC Keyboard (71)
- Magnet Keyboard (72)
- BCR Assy (125)
- Printer (126)
- Floppy Disk Drive (127)
- Keyboard Assy (128)
- PC (129)
- Fan Assy 1 Instrument Base (208), identical with Fan Assy 2 Instrument Base
- Fan Assy Electronic Rack (352)

5.3.9.5 Functional Description

BCR Assy (125)

Elecsys 1010 incorporates a bar code reader, which is mounted to the sample rotor. Primary tubes, secondary cups, calibrators, rack packs and bar code cards are positioned on the sample rotor. The bar code cards and reagent rack packs are labeled with a two-dimensional bar code (PDF 417), while the tubes and cups may be labeled with different one-dimensional bar codes. Prior to a run, the BCR reads the bar codes on the reagent labels, bar code cards and sample labels, decodes the information, performs an error detection and error correction as needed, and transfers a sequence of digits to the OEM Master via an interface. The read cycle is time independent of the actual detection cycle.
During the read cycle, the sample rotor evenly rotates past the BCR. The scan level is aligned parallel to the rotor shaft, however not across it, but tangentially positioned (at a skew angle).
The scan width covers all defined label carriers positioned on the rotor. When mounting or servicing, the BCR can be adequately adjusted (height, skew angle, radius to the center of the rotor). In normal operation, the BCR cannot be adjusted.
During the read cycle, the sample rotor evenly rotates past the BCR at a defined, constant speed. After or even during reading a label, it may stop the rotor to allow for code evaluation of the bar code logic.

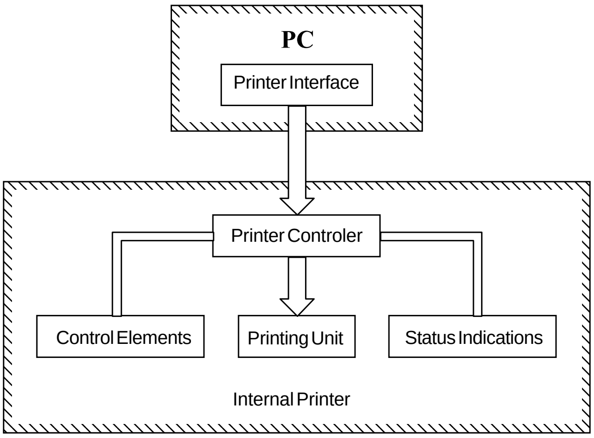
Ambient Conditions:

Defined area of use is class 1 according to IEC 359 1990, i.e. operation in dry, moderately heated laboratories or offices:

Lifetime:	5 - 6 years, daily running time of 24h, reading <1h
Operating temperature:	15 - 35 °C
Air humidity:	Relative humidity 85%, no condensation
Shock:	10-55Hz, max. 5g during 1h
Drop:	10g half-sine on all 6 axes
Dust:	negligeable
Air pressure:	corresponds to 2100m
EMC/ESD:	The BCR is subject to a superior interference suppression strategy

Printer (126)

The printer consists of the following main components: printing unit and printer controller. It is directly controlled via the PC.



Printer Controller:

ELECSYS 1010 is designed for worldwide use. Therefore, the user interface has to be easily adaptable to the local language. In order to enable the use of a standard controller that does not need to be modified, the printer is operated in the graphic mode. Thus, the conversion of characters into pixel matrix is transferred from the controller to the PC. Any country-specific characters may therefore be installed or changed without problems. For testing purposes, the printer uses standard ASCII code.

Printing Unit:

Type	Panasonic EPT 2032 S4HP
Printing Technology	>serial< Heat Transfer Printing (movable print head)
Speed	0.5 up to 1 line per second (Graphic Mode)
Printing Medium	Thermal printing paper, minimum storage life 2 years (accessory) Type: similar to Jujo TF 50 KS - E2
Width of Printout	94.6mm
Paper Dimensions	112mm wide (reel paper), 25m long, minimum reel diameter 45mm to 60mm
Feed	Friction drive
Sensors	End-of-paper detection
Lifetime	500,000 lines (check character set), paper throughput 7km

e-Tab534

Control Elements:

The printer is controlled via the PC. Since it has no special functions (several print fonts, automatic paper cut, etc.), there is a single control element: the line-feed button. By pushing this button, the paper feed will transport the paper one line further. Holding the button down for more than 0.5 seconds will start the autorepeat function, i.e. the paper feed will continue until the button is released.

Status Indications:

The on-line condition of the printer is indicated by an LED. A red LED illuminates when activated by the short-of-paper sensor. When the printer is out of paper, the LED will flash at a frequency of 2Hz.

Special Functions:

The printer has a self-test routine, which is activated by pushing the line-feed button and holding while applying the supply voltage. The self test will be repeated as long as the line-feed button is depressed. After printing the test page, the printer is ready to operate.

Interfaces:

The printer attachment is connected to the PC via a parallel port (CENTRONICS). The printer interface and voltage supply are connected to a CENTRONICS interface.

Voltage Supply:

The printer is supplied with a single voltage (5.2V DC +2% -9%). Other voltages required are generated thereof.

Keyboard Assy (128)

The keyboard assy consists of two main components, keyboard and LCD, as well as of the additional components keyboard interface, DC/DC converter and inverter.

Display:

The display is a standard VGA graphic LCD module (640 x 480 dots) B/W standard at a screen diagonal of 7.2". It is equipped with cold fluorescent background illumination for enhanced contrast.

Inverter:

The background illumination is operated by an AC voltage of approx. 320 V/ 5 mA. This voltage is generated by a DC/AC converter - the so-called inverter. After turning on or at no-load, voltages of up to 1500V (starting voltage) may occur on the inverter.

DC/DC Converter:

In addition to a logic voltage (+5V), the LCD driver circuit, which is located on the back of the LCD module, needs a negative voltage of about -18V. This voltage is generated by the DC/DC converter that can be switched on and off by the PC.

Contrast Control:

The contrast control supplies the LCD driver circuit with a variable negative voltage, which changes the optical properties of the liquid crystals.

Keyboard:

The keyboard is foil-protected and has 47 keys. The ALARM key is combined with a red LED, which is activated by the keyboard controller of the PC. For improved perception, it flashes at a frequency of 2Hz. Another LED, the power-on indicator, is located below the numeric keys. The soft keys are numbered continuously on the keyboard, starting at the right-hand uppermost soft key. The lower soft keys (soft key 8 ... 11) are numbered from the left to the right.

Keyboard Interface:

The keyboard interface is fully IBM-AT compatible. It requires only 2 signal lines for communication with the PC and allows for bidirectional data transfer. This enables the activation of functions in the keyboard assy via keyboard commands.

Buzzer:

The keyboard gives the operator an active feedback function. That means a short beep is emitted when a key is pressed. This enables extensive data entries without permanently watching the screen. The active feedback function can be activated or deactivated by means of a keyboard command via the PC. Basic setting is active.
In addition, the buzzer emits audible alarms given out by the instrument, which are controlled by different keyboard commands.

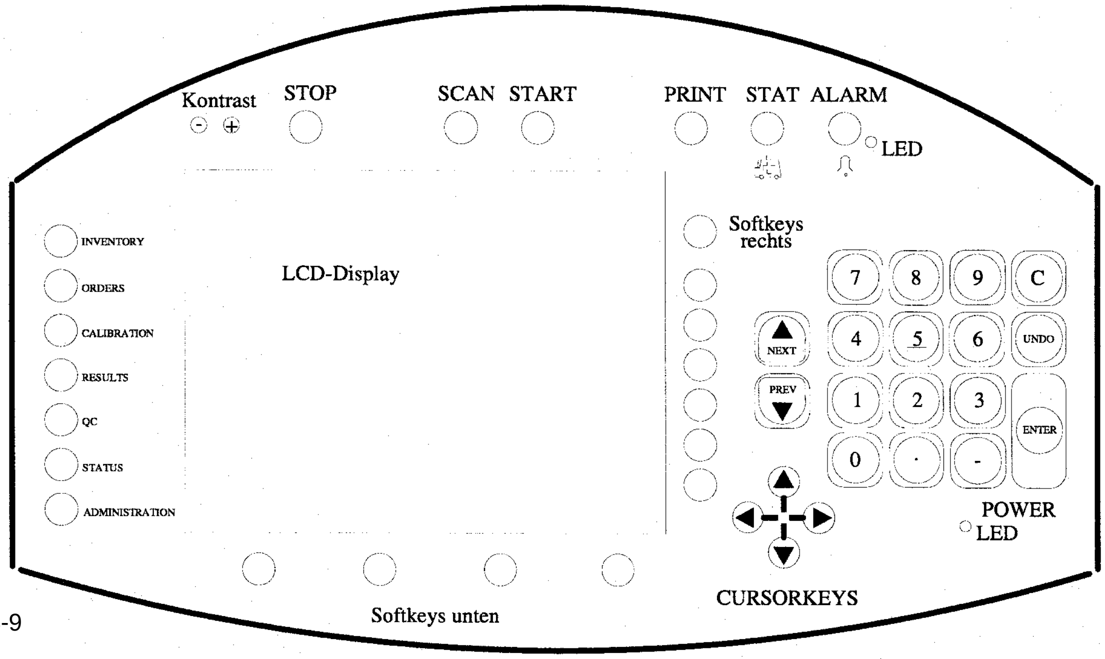


Fig. 5-3-9

Floppy Disk Drive (127)

The floppy disk drive is a commonly available standard product with the following features:

- 3.5" drive
- 1.44 MB capacity
- compatible according to IBM/AT specification

Interfaces:

Connector	34 pole Pin-Type Socket, Space 2.54mm
Required Counterpart	34 pole Female Multipoint Connector Insulation Displacement Type
Standard	IBM/AT-Standard

e-Tab535

Pin	Short Description	Direction	Pin	Short Description	Direction
1	GND	-	18	DIR CONTROL	I
2	RPM/LC	I	19	GND	-
3	GND	-	20	STEP	I
4	not used	-	21	GND	-
5	GND	-	22	WRITE DATA	I
6	not used	-	23	GND	-
7	GND	-	24	WRITE ENABLE	I
8	INDEX	O	25	GND	-
9	GND	-	26	TRACK0	O
10	MOTOR ON 0,1	I	27	HDOUT (2.88MB)	O
11	GND	-	28	WRITE PROTECT	O
12	DRIVE SELECT B	I	29	not used	-
13	GND	-	30	READ DATA	O
14	DRIVE SELECT A	I	31	GND	-
15	GND	-	32	HEAD SELECT	I
16	MOTOR ON 2	I	33	not used	-
17	not used	-	34	DSKCHG	O

e-Tab536

Voltage Supply:

The power supply assy of Elecsys 1010 does not provide 12V. Therefore, the floppy drive is operated with 5V.

-	Supply	5.2 V +2% -9%
-	Tolerance	4.75V ... 5.25V
-	Stray Power	5W

Connector	4pole AMP pin-type socket
Required Counterpart	4pole female multipoint connector
Standard	IBM/AT-Standard

Software:

The floppy drive must be fully compatible with the IBM/AT standard also with regard to the software.

Specification Change and Option

Short Plug Connection and Pin Assignment (SS01)

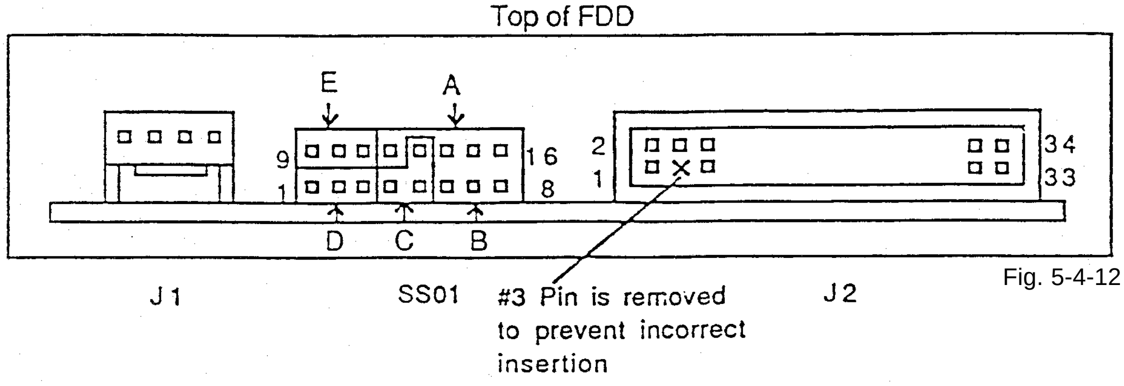


Fig. 5-4-12

A Block

14 - 15	The drive is selected by Drive Select 0	*
15 - 16	The drive is selected by Drive Select 1	

* Standard setting when shipped

B Block

6 - 7	The drive is selected by Drive Select 2	
7 - 8	The drive is selected by Drive Select 3	

* Standard setting when shipped

C Block

4 - 5	The mode is switched by the internal sensor	*
5 - 13	The mode is switched by the HDI input	

* Standard setting when shipped

D Block

1 - 2	The 2M mode is set by the HDI input "HIGH."	
2 - 3	The 2M mode is set by the HDI input "LOW."	*

* Standard setting when shipped

E Block

9	Grounding
10 & 11	Test terminal (differentiated signal output terminal) HDI

<Note>
(1) The test terminal is a terminal of 0.5 □, 2mm pitch.
(2) Measuring instruments to be connected to the test terminal must have a high input impedance. The length of the connection cable shall not exceed 1 meter.

Others

12	Test terminal (terminal for factory drive adjustment)

Short Plug Assignment

PC (129)

The industrial PC is fully IBM-PC/AT compatible (IEEE P 996) based on 80486DX- or 80486SX-CPUs. Clock speed is reduced to 20MHz for decreasing heat dissipation of the CPU.

Storage Media:

Besides standard media floppy disk and DRAM the PC provides battery backed SRAM, and flash replacing the hard disk. The PC is bootable by floppy and flash. In addition, it includes battery backed setup and RTC.

Description	**Specification**	**Remark**
Floppy Disk Controller	3.5" 1.44MB, 288 MB	Floppy Drive not included
Hard Disk Controller	IDE Standard	by default not used
DRAM 1 PS/2 Simm socket	4MB, optional 1MB, 2MB, 8MB	
SRAM 2 DIP sockets	512KB, optional 128 KB, 256KB, 1 MB	battery backed
Flash-EPROM	4MB, optional 2MB	on board programmable
SETUP	PC/AT Standard	incl. RTC battery backed

e-Tab537

Interfaces:

The industrial PC provides a standard AT keyboard and a VGA LCD Interface. Graphics drive b/w LCDs. In total, 3 serial and 2 parallel ports are used. The external power supply generates a power fail signal (TTL level), if primary supply leaves defined area. A TTL input generates of this signal a NMI (Non Maskable Interrupt). Also the power supply generates a netsync signal (TTL level). This provides information about net frequency and phase for synchronizing the measuring system. A TTL output power down allows to enable the power part of the supply. The analyzing modules are connected by CAN Bus . The PC CAN controller is based on Intel 82527 (no other µC) and a modified RS-485-Interface physically.

Connection	**Specification**	**Remarks**
Keyboard	AT-Keyboard-Interface	PC/AT-Standard
Serial		
Host	RS-232 #1 (COM1)	external use(1)
reserved	RS-232 #2 (COM2)	external use(1)
Bar Code Reader 2-D	RS-232 #4 (COM4, Interrupt 11)	external use(1)
Parallel		
External Printer	CENTRONICS #1	
Internal Printer	CENTRONICS #2	
Hard Disk	IDE-Standard	
Floppy Disk	PC-Standard	
LCD display	b/w VGA-LCD	
Powerfail	TTL-input generates NMI	
Netsync	TTL-input	
Powerdown	TTL-output	powerdown on low level
Field-Bus		
CAN-Controller	Intel 82527	
Physical Interface	RS-485 modified	

e-Tab538

(1) ESD protection circuits for 10kV have to be inserted

Serial Interfaces #1 and #2:

Connector	10pin Robinson Nugent IDS-C10PK-TG
Standard	IBM 9-pin version of RS-232 C according to ANSI/EIA-232-D-1986 (DTE - Data Terminal Equipment)
Baud Rate	38400, 19200, 9600, 4 00, 2400, 1200, 600, 300 Baud
Word	1 start bit, 8 data bits, 1 or 2 stop bits
Parity	none, odd, even
Interrupt	IRQ3, IRQ4
Signal Level	High [-3V, -15V], Low [+3V, +15V]
Protocol	XON/XOFF operation

e-Tab539

Serial Interface #4

This serial line is specially designed for the 2D Bar Code Reader (connector, additional power).

Connector	10pin JST-PHDSS type B 10B-PHDSS
Standard	IBM 9-pin version of RS-232 C according to ANSI/EIA-232-D-1986 (DTE-Data Terminal Equipment)
Baud Rate	38400, 19200, 9600, 4800, 2400, 1200, 600, 300 Baud
Word	1 start bit, 8 data bits, 1 or 2 stop bits
Parity	none, odd, even
Interrupt	IRQ11
Signal Level	High * [-3V, -15V], Low * [+3V, +15V]
Protocol	XON/XOFF operation

e-Tab5311

Parallel Interfaces #1 and #2:

The parallel Interfaces allow to connect a DB25 straight to the 26pin header.

Connector	26 pin Robinson Nugent IDS-C26PK-TG
Standard	CENTRONICS-compatible
Signal level	TTL High [2.4V, 5V], Low [0V, 0.8V]
Format	8 Bit parallel
Protocol	synchronisation STROBE - pulse acknowledge ACKN - pulse wait BUSY - signal
Lenght	max 1 m

e-Tab5312

IDE Interface:

40pin standard connector (2.54 pitch)

FD-Interface:

Pinning allows to use 34pin standard FD cables.

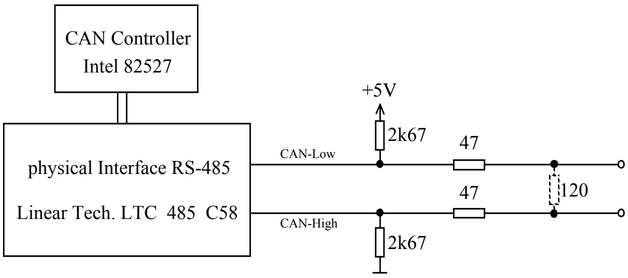
Display Interface (incl. Keyboard Interface):

The display interface includes control signals for the LCD Modules. The LCD-VEE and backlight AC are generated externally. No power has to be provided.

Field Bus:

CAN Bus realized by the Intel CAN controller 82527 without additional µC. Physically according to modified RS-485-Interface. The CAN controller is memory mapped.
The CAN bus connects the modules to the PC. The industrial PC is the bus master and accords to the modules. Bus needs pull up and downs and optional termination.

By default the bus operates at low speed, so termination is not installed.



Modified RS485 Interface

Connector	no separate connector, combined with power terminal		
Signal levels		recessive	dominant
	VCAN_L	3.1V...3.4V	0V...1.15V
	VCAN_H	1.6V...1.9V	3.85V... 5.0V

Speaker:

Like Standard PC there has to be installed a speaker interface to drive an externally mounted speaker.
The speaker is used to give out acoustical warnings. In addition, it can be very helpful to hear the standard-PC message-noises like memory-tic-sound, boot-up-beep, error messages (memory failure, keyboard error, VGA error).

Special Functions:

A watchdog timer supervises the software. After recognition of malfunction, watchdog provides a status bit. The watchdog may be disabled by jumper.

Supply:

The SBC is supplied by 5V only.

Supply	Tolerance	max
5.2V DC	4.75 ...5.25	12W max.
GND	-	-

Li Battery:

Capacity of Li battery accords to 5 years lifetime (standard operating conditions).
Li battery must be changeable. It has to be insulated to the other components around, to prevent self-discharging. The mechanical protection against disconnection is realized by a spring plate mounted at the top of the shielding case (part of the Elecsys 1010 housing).

Determined Types:

1)	QCT 85 3B880	Electrochem
2)	SL - 340/P	Sonnenschein

These battery types are permitted by VDE.

Operating System:

The industrial PC operates the Real Time Operating System pSOS Version: 2.0.
The PC also operates the pFLASH Version 2.1. This will be necessary, because there have to be transferred big data bundles (>3MByte) per Floppy Disk to the Flash EPROM.

Memory Map:

Feature	**Starting Address**	**Ending Address**
TEKNOR BIOS	C8000	CBFFF
Flash area	CC000	CFFFF
CAN Controller	D0000	D3FFF

e-Tab5310

Connectors Overview:

Interface	**Name**	**Pins**	**Remark**
CENTRONICS #1	X1	26	
CENTRONICS #2	X2	26	
RS-232 #1	X3	10	
RS-232 #2	X4	10	5 V supply
RS-232 #4	X6	10	Bar Code Reader
LCD-VGA+Keyboard	X7	26	
Floppy Disk	X8	34	
IDE	X9	40	optional, connector not mounted
Power Supply / CAN	X10	11	also for speaker connection

e-Tab5313

Standard Configuration on Delivery:

Jumper (TEK 362)	
W1	open
W2	open
W3	open
W4	2-3
W5	1-2, 3-4, 5-6
W7	closed
W8	5-6
W9	closed
W10	open
W11	1-2
W12	open

e-Tab5314

Standard C-MOS Configuration:

Hard Drive c	not installed
Hard Drive d	not installed
Floppy Drive a	1.44 MB 3.5 "
Floppy Drive b	not installed
Primary Display	VGA\PGA\EGA
Keyboard	installed

e-Tab5315

Fan Assys 1 and 2 Instrument Base (208)

The fan assemblies transport the heat generated in Elecsys 1010 outside.

Fan Assy Electronic Rack (352)

The fan assembly electronic rack cools the PCBs mounted in the electronic rack.

PCB Dist Voltage (4)

For description please refer to Chapter 5.3.2

Power Supply Assy (1)

For description please refer to Chapter 5.3.2

PhC Keyboard (71)

The photo coupler checks if the STAT holder is fully inserted.

Magnet Keyboard (72)

The magnet locks the STAT holder. It has 2 stable states (polarity reversal). In the absence of current, the magnet remains in the latest actively driven position. In the absence of current it may be released manually.

5.4 Printed Circuit Boards

5.4.1 PCB OEM Master Part 1 of 3 Functional Diagram

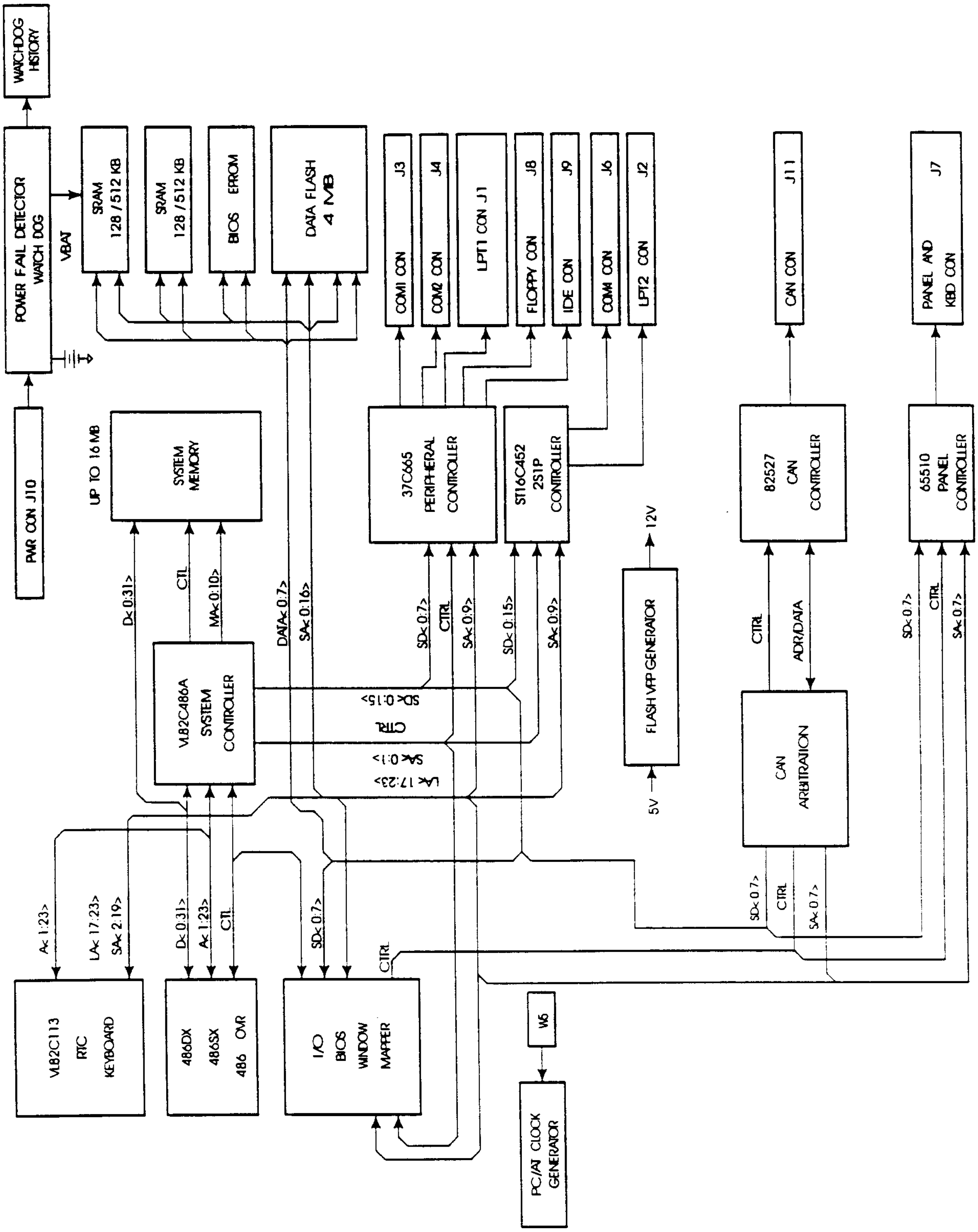

WATCHDOG HISTORY
POWER FAIL DETECTOR WATCH DOG
VBAT
PWR CON J10
SRAM 128 / 512 KB
SRAM 128 / 512 KB
BIOS EPROM
DATA FLASH 4 MB
COM1 CON J3
COM2 CON J4
LPT1 CON J1
FLOPPY CON J8
IDE CON J9
COM CON J6
LPT2 CON J2
CAN CON J11
PANEL AND KBD CON J7
UP TO 16 MB
SYSTEM MEMORY
D< 0:31>
CTL
MA< 0:10>
DATA< 0:7>
SA< 0:16>
37C665 PERIPHERAL CONTROLLER
SD< 0:7>
CTRL
SA< 0:9>
ST16C452 2S1P CONTROLLER
SD< 0:15>
SA< 0:9>
12V
FLASH VPP GENERATOR
5V
82527 CAN CONTROLLER
CTRL
ADR/DATA
CAN ARBITRATION
65510 PANEL CONTROLLER
SD< 0:7>
CTRL
SA< 0:7>
VL82C486A SYSTEM CONTROLLER
SD< 0:15>
CTRL
SA< 0:1>
LA< 17:23>
A< 1:23>
LA< 17:23>
SA< 2:19>
D< 0:31>
A< 1:23>
CTL
SD< 0:7>
CTRL
SD< 0:7>
CTRL
SA< 0:7>
VL82C113 RTC KEYBOARD
486DX 486SX 486 OVR
I/O BIOS WINDOW MAPPER
W6
PC/AT CLOCK GENERATOR

DIAGRAM C-4: TEK362 Block Diagram

Fig. 5-4-1

5.4.1 PCB OEM Master Part 2 of 3 Jumper Settings

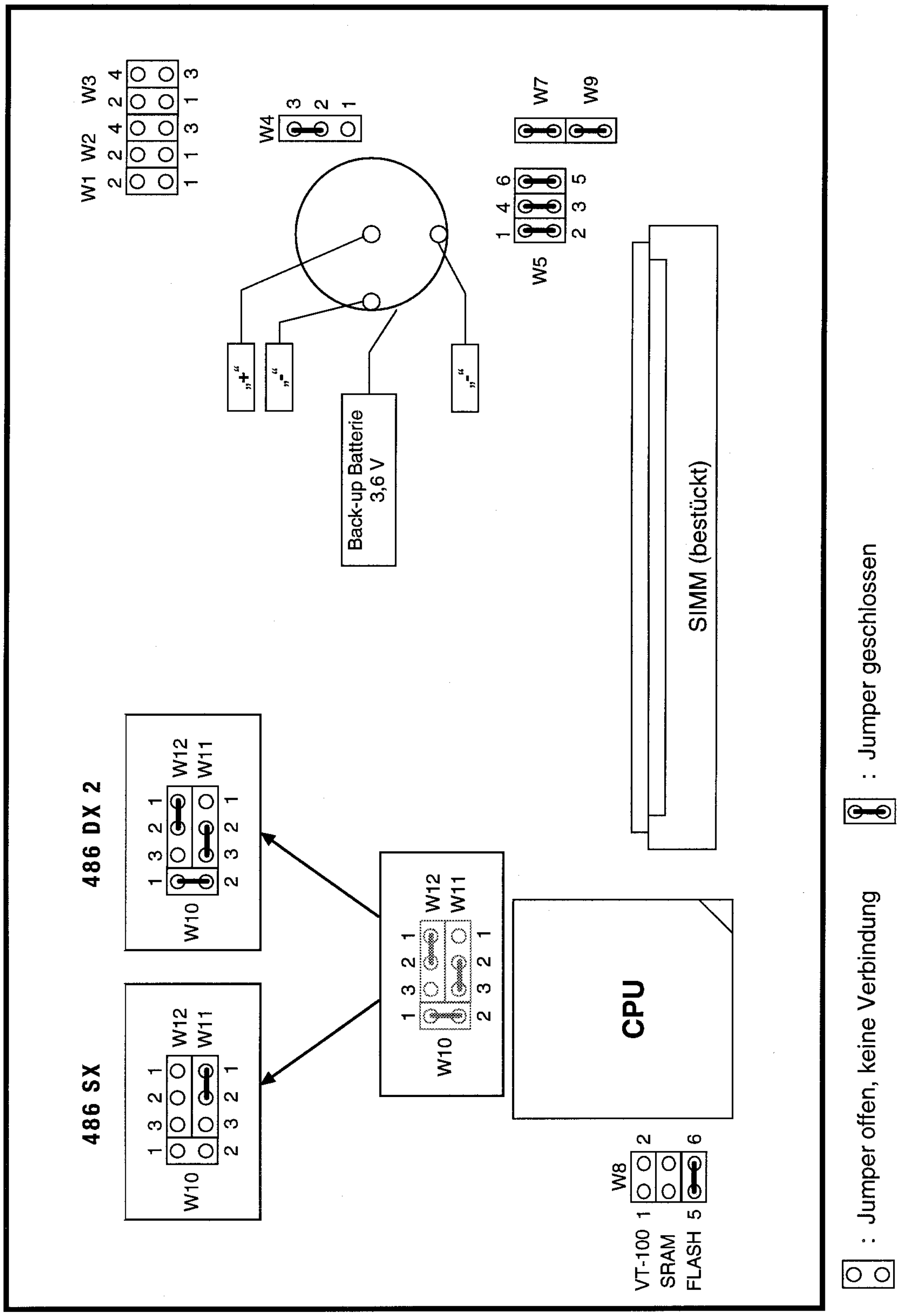

W1
W2
W3
W4
W5
W7
W9
„+“
„-“
„-“
Back-up Batterie
3,6 V
SIMM (bestückt)
CPU
486 SX
486 DX 2
W10
W11
W12
W8
VT-100
SRAM
FLASH
: Jumper offen, keine Verbindung
: Jumper geschlossen

Fig. 5-4-1a

5.4.1 PCB OEM Master Part 3 of 3 CMOS Setup

BM wants to receive the T362ACC_1B boards from Teknor in a completely configured state. This Stateshould be reachable by the following procedure:

- Set Jumpers
- Set Standard CMOS Setup
- Load Advanced CMOS Setup from BIOS Setup Defaults
- Load Advanced Chipset Setup from BIOS Setup Defaults
- Do not define a password

The same procedure will be used when boards have to be reconfigured by Roche (in case of backup battery failure, repair, etc).

Jumperpositions see table 1657534 742 (Jumpersettings Elecsys 1010).

Standart CMOS configuration:

Date	GMT+1h
Time	GMT+1h
Hard Disk C: Type	not installed
Hard Disk D: Type	not installed
Floppy Drive A:	1.44MB 3.5"
Floppy Drive B:	not installed
Primay Display	VGA/PGA/EGA
Keyboard	installed

e-5-4-1a

Remark

Flash-Disk:
Pflash will be execute with a dummy file for installing Flash Disk to C.

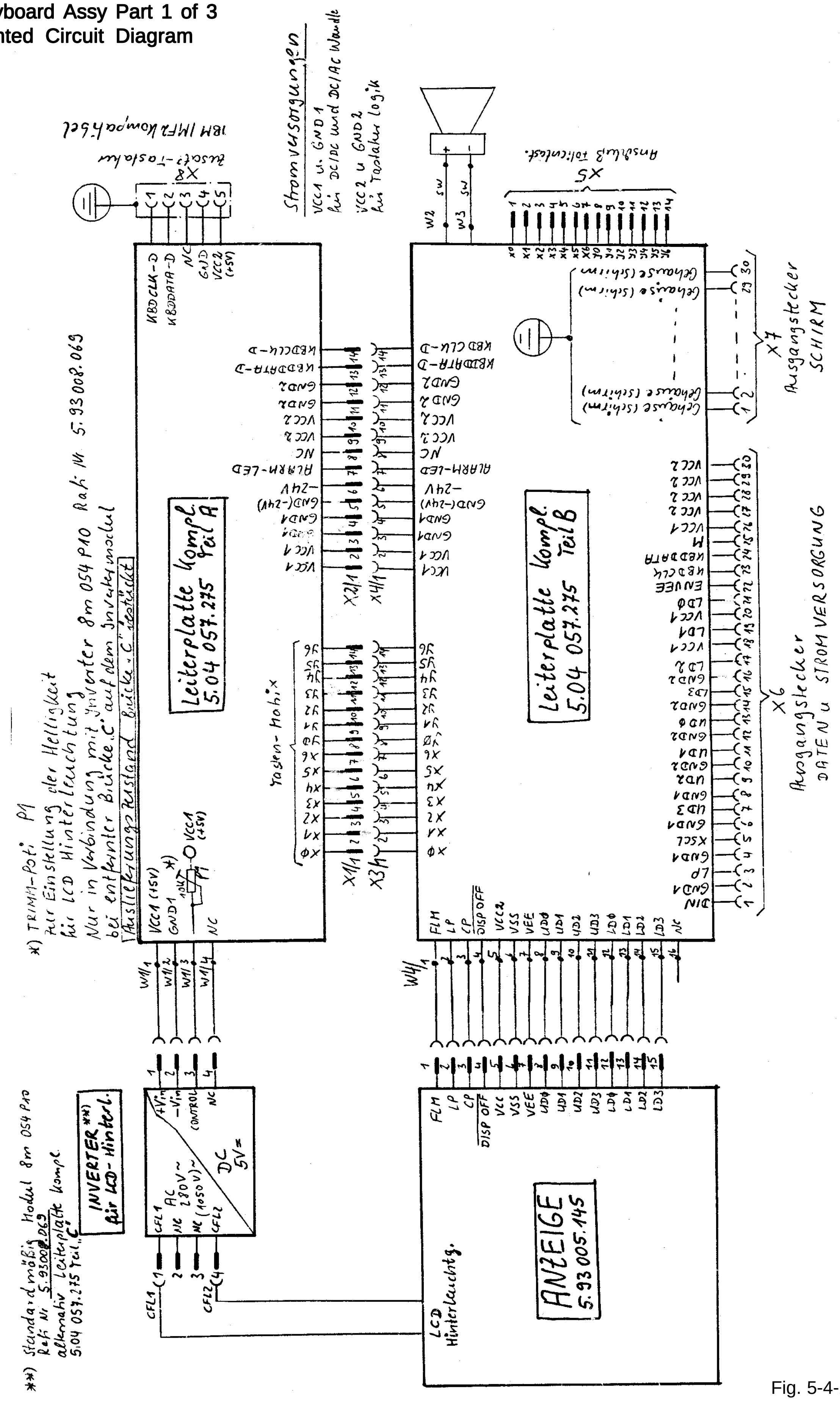
SRAM-Disk:
SRAM-Disk will be patitioned and formated as disk D: under DOS

Advanced CMOS Setup - BIOS Setup Defaults:

Field	
Typematic Rate Programming	Enabled
Typematic Rate Delay (msec)	500
Typematic Rate (Chars/Sec)	6
Above 1MB Memory Test	Enabled
Memory Test Tick Sound	Disabled
Memory Parity Error Check	Enabled
Hit <DEL> Message Disply	Disabled
Hard Disk Type 47 RAM Area	0:300
System Boot Up Num Lock	Off
Floppy Drive Seek At Boot	Enabled
System Boot Up Sequence	A:, C:
System Boot Up CPU Speed	High
Internal Cache Memory	Enabled
Fast Gate A20 Option	Enabled
Password Checking Option	Setup
Adaptor ROM Shadow C800, 16K	Disabled
Adaptor ROM Shadow CC00, 16K	Disabled
Adaptor ROM Shadow D000, 16K	Disabled
Adaptor ROM Shadow D400, 16K	Disabled
Adaptor ROM Shadow D800, 16K	Disabled
Adaptor ROM Shadow DC00, 16K	Disabled
Adaptor ROM Shadow E000, 16K	Disabled
Adaptor ROM Shadow E400, 16K	Disabled
Adaptor ROM Shadow E800, 16K	Disabled
Adaptor ROM Shadow EC00, 16K	Disabled
Shadow RAM Option	Both

e-5-4-1b

5.4.2 Keyboard Assy Part 1 of 3
Printed Circuit Diagram


Leiterplatte Kompl. 5.04 057.275 Teil A
Leiterplatte Kompl. 5.04 057.275 Teil B
ANZEIGE 5.93 005.145
INVERTER **) für LCD-Hinterl.
LCD Hinterleuchtg.
AC 280V~ (1050V)~
DC 5V=
CFL1
NC
NC
CFL2
+Vin
-Vin
CONTROL
NC
W1/1
W1/2
W1/3
W1/4
VCC1 (+5V)
GND1
NC
10k
P1
VCC1 (+5V)
KBDCLK-D
KBDDATA-D
NC
GND
VCC2 (+5V)
X8
Zusatz-Tastatur
IBM MF2 Kompatibel
Tasten-Matrix
X0
X1
X2
X3
X4
X5
X6
Y0
Y1
Y2
Y3
Y4
Y5
Y6
X1/1
X3/1
X2/1
X4/1
VCC1
VCC1
GND1
GND1
GND(-24V)
-24V
ALARM-LED
NC
VCC2
VCC2
GND2
GND2
KBDDATA-D
KBDCLK-D
Stromversorgungen
VCC1 u. GND1 für DC/DC und DC/AC Wandler
VCC2 u GND2 für Tastatur Logik
W2
W3
sw
sw
+
-
X5
Anschluß Folientast.
W4/1
FLM
LP
CP
DISP OFF
VCC2
VCC
VSS
VEE
UD0
UD1
UD2
UD3
LD0
LD1
LD2
LD3
NC
DIN
GND1
LP
XSCL
GND1
UD3
GND1
UD2
GND2
UD1
GND2
UD0
GND2
LD3
GND2
LD2
VCC1
LD1
VCC1
LD0
ENVEE
KBDCLK
KBDDATA
M
VCC1
VCC2
VCC2
VCC2
VCC2
Gehäuse (Schirm)
X6
Ausgangsstecker DATEN u STROMVERSORGUNG
X7
Ausgangsstecker SCHIRM

*) TRIMM-Poti P1
zur Einstellung der Helligkeit
für LCD Hinterleuchtung
Nur in Verbindung mit Inverter 8m 054 P10 Ref. Nr. 5.93008.069
bei entfernter Brücke „C" auf dem Invertermodul
Auslieferungszustand Brücke „C" bestückt

**) Standardmäßig Modul 8m 054 P10
Ref. Nr. 5.93008.069
alternativ Leiterplatte kompl.
5.04 057.275 Teil „C"

Fig. 5-4-2

5.4.2 Keyboard Assy Part 2 of 3 Printed Circuit Diagram

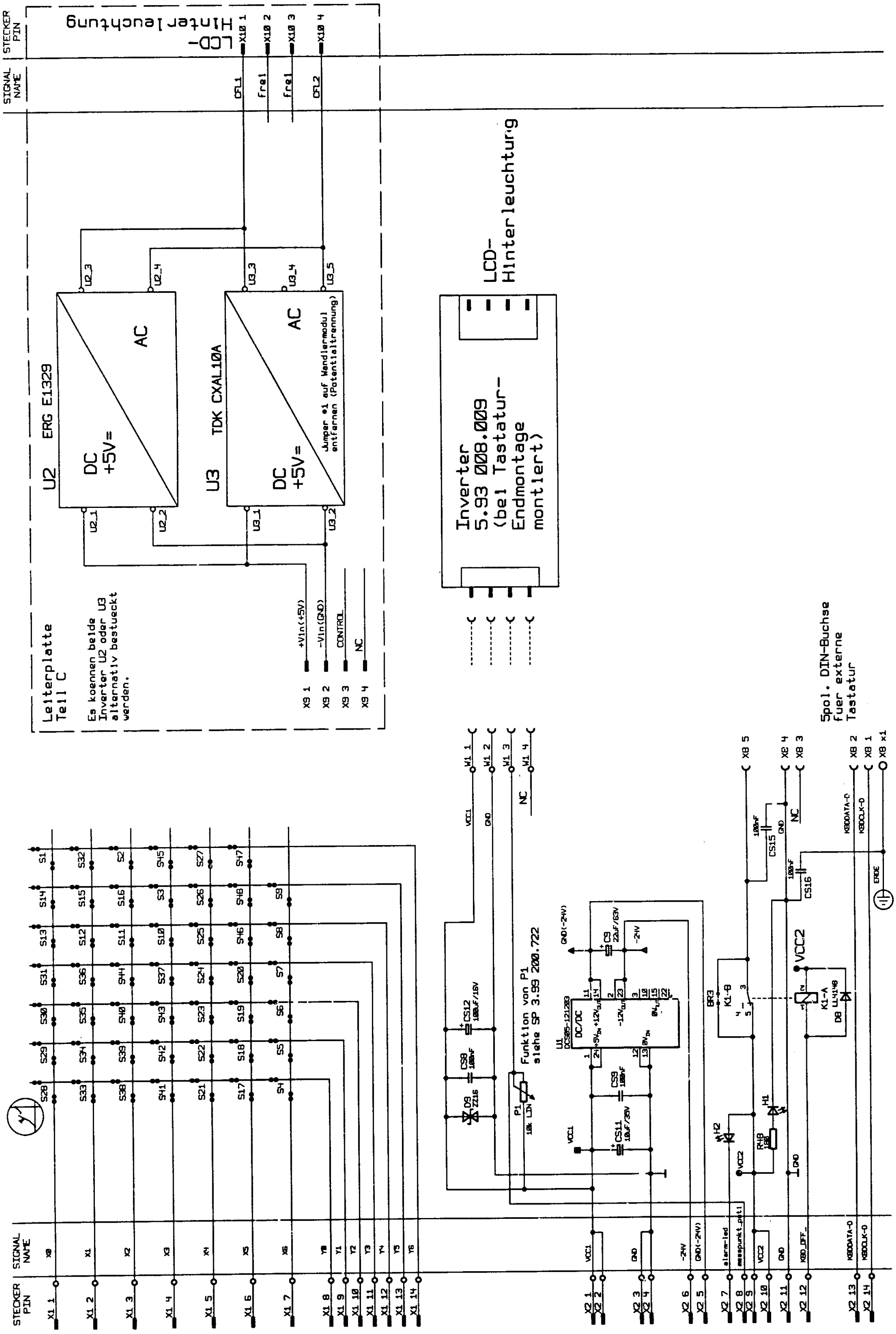

STECKER PIN
SIGNAL NAME
LCD-Hinterleuchtung
X10 1
X10 2
X10 3
X10 4
CFL1
frei
frei
CFL2
U2 ERG E1329
DC +5V=
AC
U3 TDK CXAL10A
Jumper e1 auf Wandlermodul entfernen (Potentialtrennung)
Leiterplatte Teil C
Es koennen beide Inverter U2 oder U3 alternativ bestueckt werden.
+Vin(+5V)
-Vin(GND)
CONTROL
NC
X9 1
X9 2
X9 3
X9 4
Inverter 5.93 008.009 (bei Tastatur-Endmontage montiert)
LCD-Hinterleuchtung
W1 1
W1 2
W1 3
W1 4
VCC1
GND
NC
Funktion von P1 siehe SP 3.99 200.722
P1 10k LIN
D9 ZZ16
C58 100nF
CS12 100uF/16V
CS11 10uF/35V
CS9 100nF
U1 DCS05-12129
C9 22uF/63V
GND(-24V)
-24V
K1-B
K1-A
BR3
D8 LL4148
VCC2
H1
H2
R18
CS15
CS16
100nF
ERDE
5pol. DIN-Buchse fuer externe Tastatur
X8 5
X8 4
X8 3
X8 2
X8 1
X8 x1
KBDDATA-O
KBDCLK-O
X0
X1
X2
X3
X4
X5
X6
Y0
Y1
Y2
Y3
Y4
Y5
Y6
X1 1
X1 2
X1 3
X1 4
X1 5
X1 6
X1 7
X1 8
X1 9
X1 10
X1 11
X1 12
X1 13
X1 14
X2 1
X2 2
X2 3
X2 4
X2 5
X2 6
X2 7
X2 8
X2 9
X2 10
X2 11
X2 12
X2 13
X2 14
alarm-led
messpunkt_poti
KBD_OFF_

Fig. 5-4-2s

5.4.2 Keyboard Assy Part 3 of 3 Printed Circuit Diagram

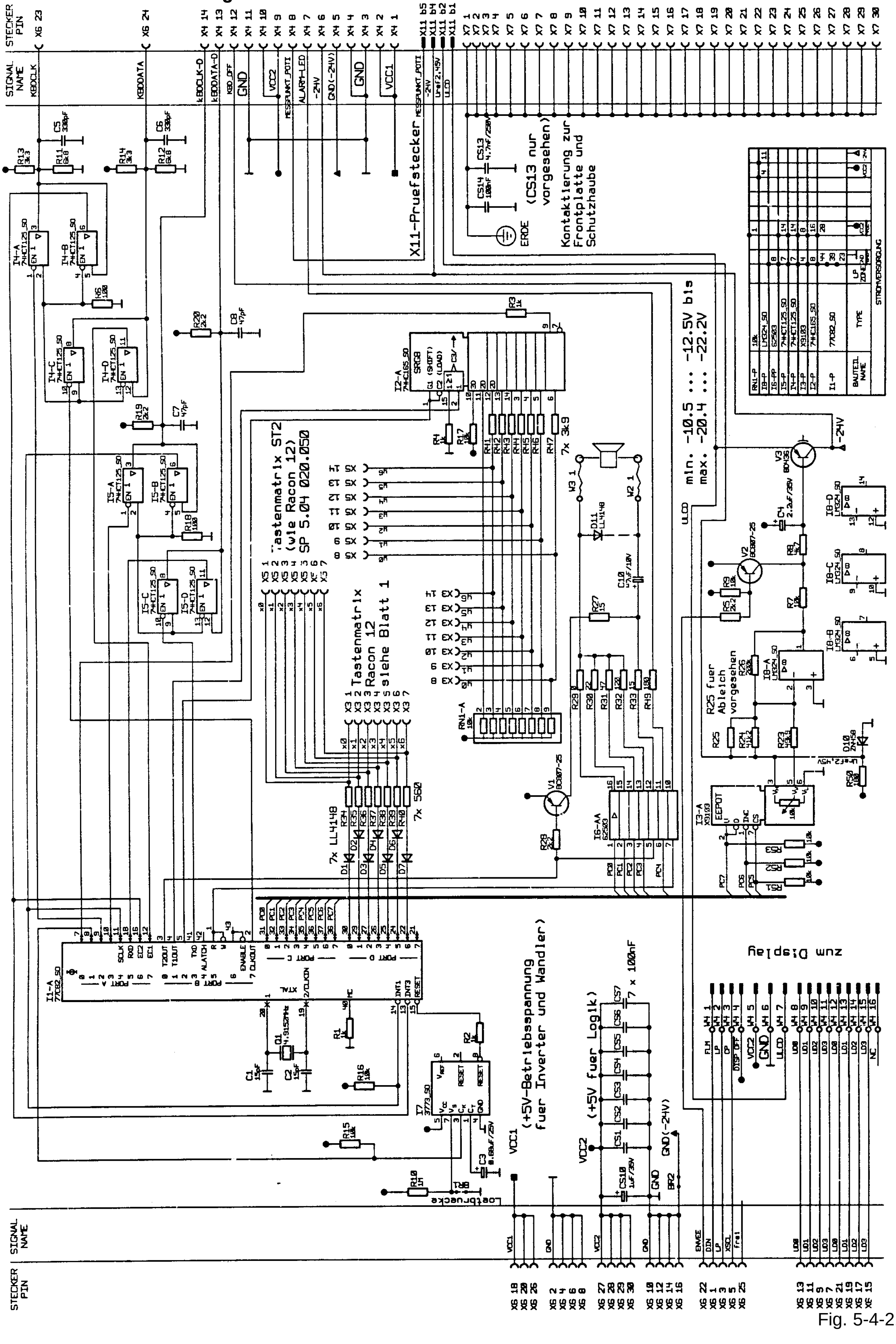

STECKER PIN
SIGNAL NAME
KBDCLK
KBDDATA
X11-Pruefstecker
(CS13 nur vorgesehen)
Kontaktierung zur Frontplatte und Schutzhaube
ERDE
min. -10.5 ... -12.5V bis
max. -20.4 ... -22.2V
Tastenmatrix ST2 (wie Racon 12) SP 5.04 020.050
Tastenmatrix Racon 12 siehe Blatt 1
7x LL4148
7x 560
7x 3k9
R25 fuer Ableich vorgesehen
zum Display
(+5V-Betriebsspannung fuer Inverter und Wandler)
(+5V fuer Logik)
7 x 100nF
I1-A 77C82_SO
I2-A 74HC165_SO
I3-A X9103 EEPOT
I6-AA 62583
I7 3773_SO
V1 BC807-25
V2 BC807-25
V3 BD436
Loetbruecke
VCC1
VCC2
GND
GND(-24V)
BAUTEIL NAME
TYPE
STROMVERSORGUNG

Fig. 5-4-21s

5.4.3 PCB Motherboard Part 1 of 2
Printed Circuit Diagram

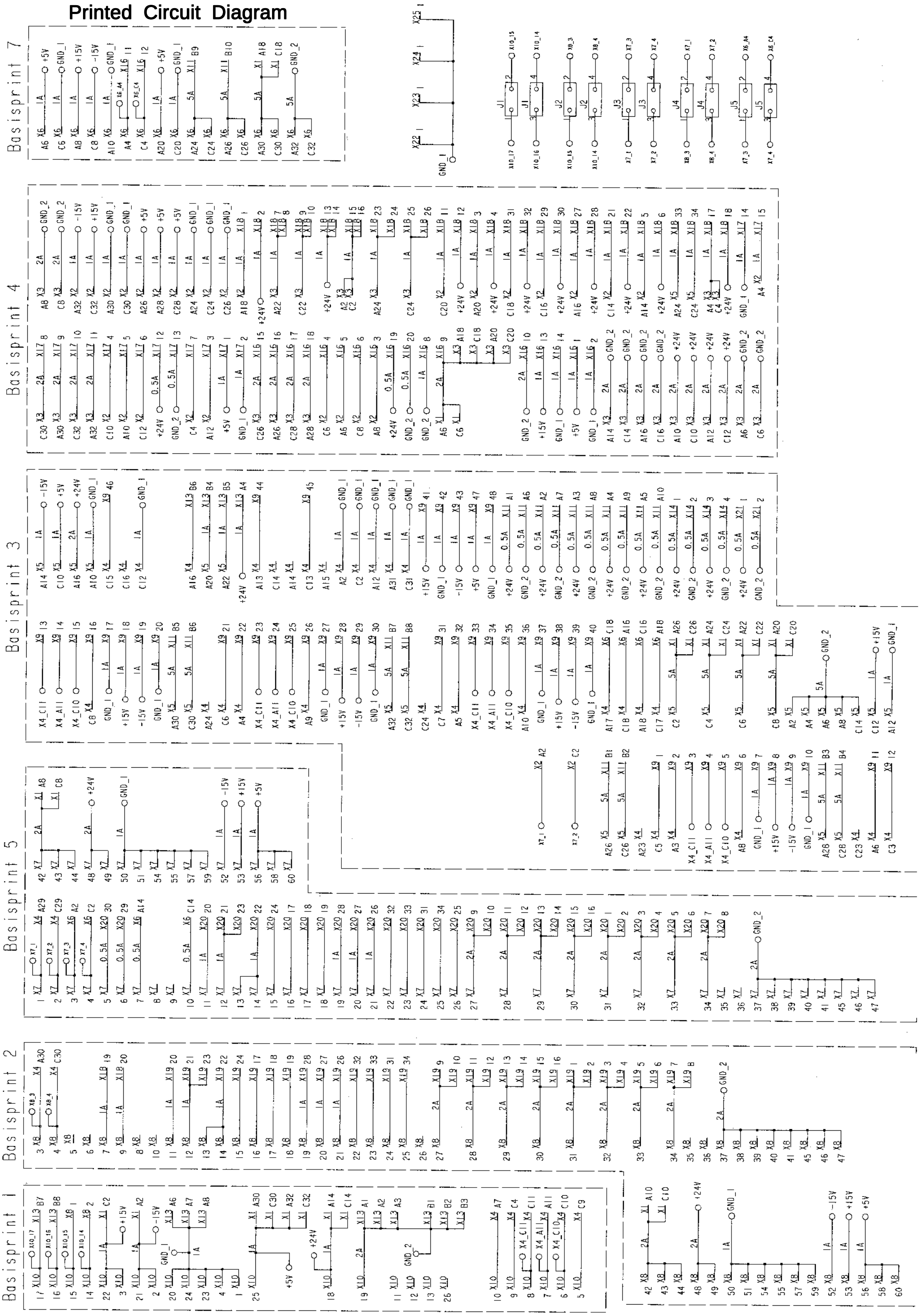

Basisprint 7
Basisprint 4
Basisprint 3
Basisprint 5
Basisprint 2
Basisprint 1
J1
J2
J3
J4
J5
X22
X23
X24
X25
GND_1

Fig. 5-4-3s

5.4.3 PCB Motherboard Part 2 of 2 Layout Diagram

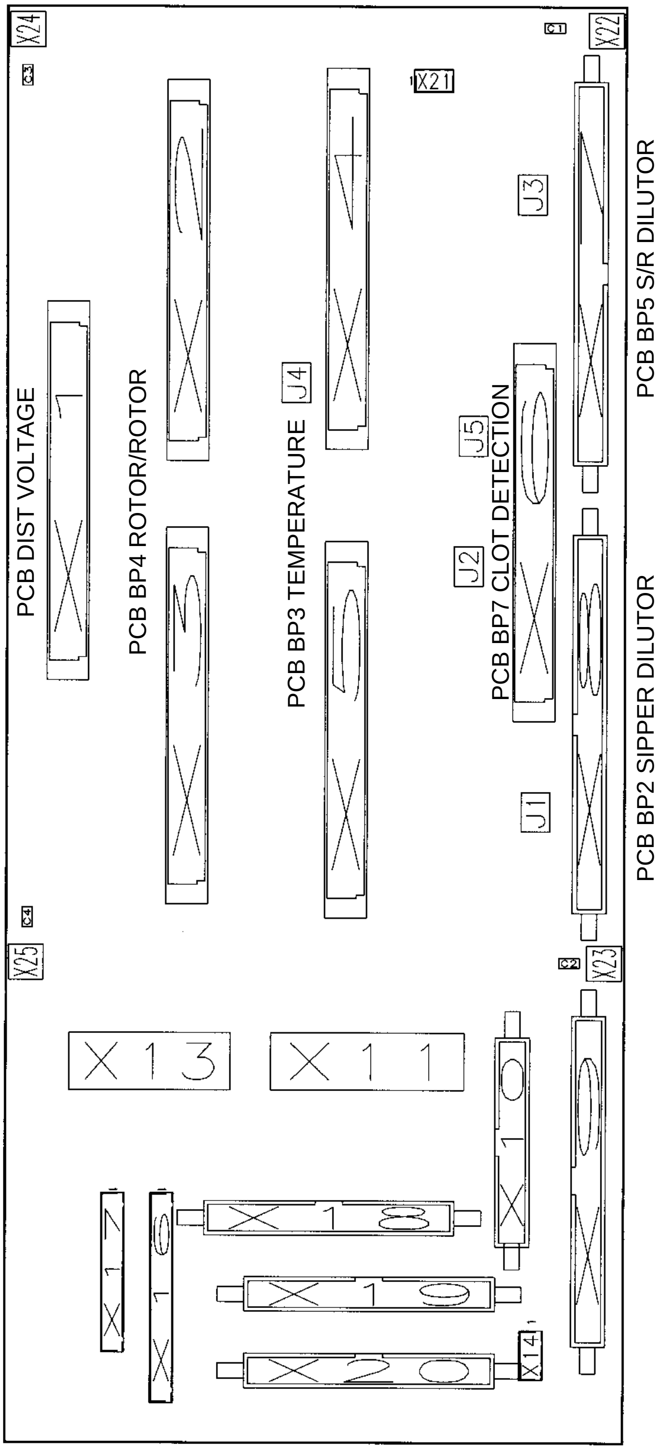

X24
C3
X22
C1
X21
J3
J4
J5
J2
J1
X1
X2
X3
X4
X5
X6
X7
X8
X9
PCB DIST VOLTAGE
PCB BP4 ROTOR/ROTOR
PCB BP3 TEMPERATURE
PCB BP7 CLOT DETECTION
PCB BP5 S/R DILUTOR
PCB BP2 SIPPER DILUTOR
C4
X25
C2
X23
X13
X11
X10
X17
X16
X18
X19
X20
X14

Fig. 5-4-3b

5.4.4 PCB Dist Voltage Part 1 of 2 Printed Circuit Diagram

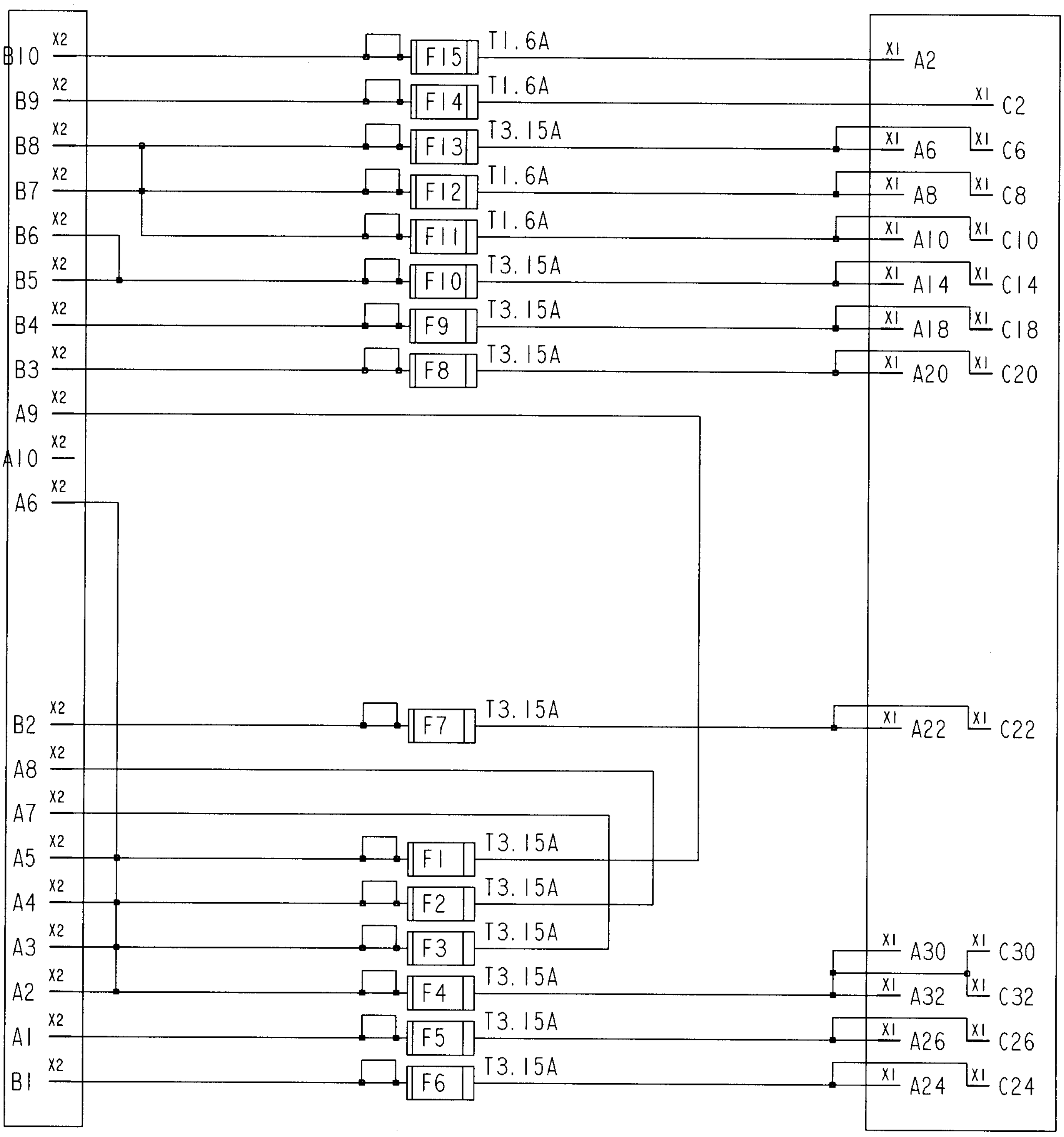

X2
B10
B9
B8
B7
B6
B5
B4
B3
A9
A10
A6
B2
A8
A7
A5
A4
A3
A2
A1
B1
F15
T1.6A
F14
T1.6A
F13
T3.15A
F12
T1.6A
F11
T1.6A
F10
T3.15A
F9
T3.15A
F8
T3.15A
F7
T3.15A
F1
T3.15A
F2
T3.15A
F3
T3.15A
F4
T3.15A
F5
T3.15A
F6
T3.15A
X1
A2
C2
A6
C6
A8
C8
A10
C10
A14
C14
A18
C18
A20
C20
A22
C22
A30
C30
A32
C32
A26
C26
A24
C24

Fig. 5-4-4s

5.4.4 PCB Dist Voltage Part 2 of 2 Layout Diagram

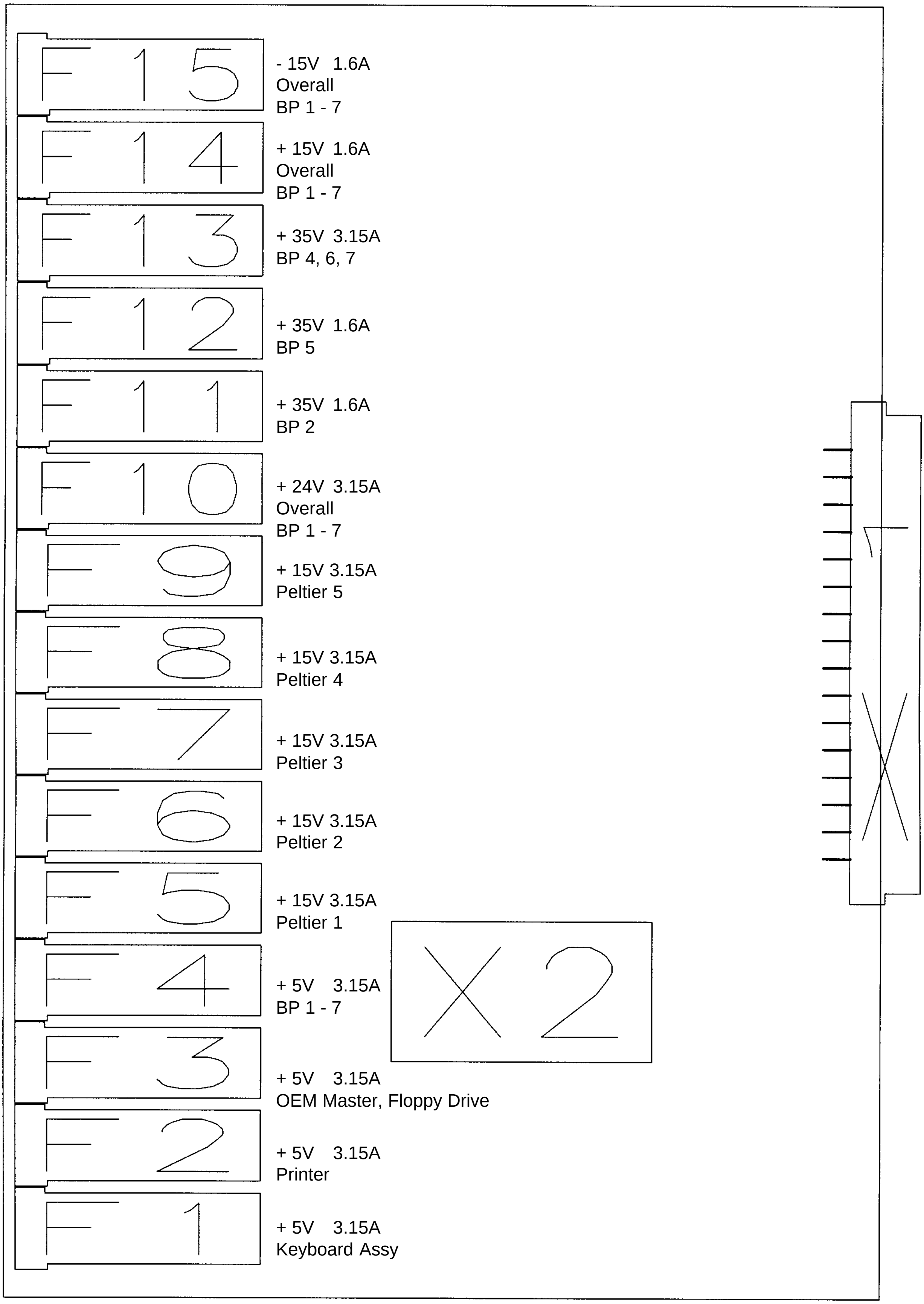

F 15
- 15V 1.6A
Overall
BP 1 - 7
F 14
+ 15V 1.6A
Overall
BP 1 - 7
F 13
+ 35V 3.15A
BP 4, 6, 7
F 12
+ 35V 1.6A
BP 5
F 11
+ 35V 1.6A
BP 2
F 10
+ 24V 3.15A
Overall
BP 1 - 7
F 9
+ 15V 3.15A
Peltier 5
F 8
+ 15V 3.15A
Peltier 4
F 7
+ 15V 3.15A
Peltier 3
F 6
+ 15V 3.15A
Peltier 2
F 5
+ 15V 3.15A
Peltier 1
F 4
+ 5V 3.15A
BP 1 - 7
X2
F 3
+ 5V 3.15A
OEM Master, Floppy Drive
F 2
+ 5V 3.15A
Printer
F 1
+ 5V 3.15A
Keyboard Assy

Fig. 5-4-4b

5.4.5 PCB Detection Module BP1 Part 1 of 3 Printed Circuit Diagram

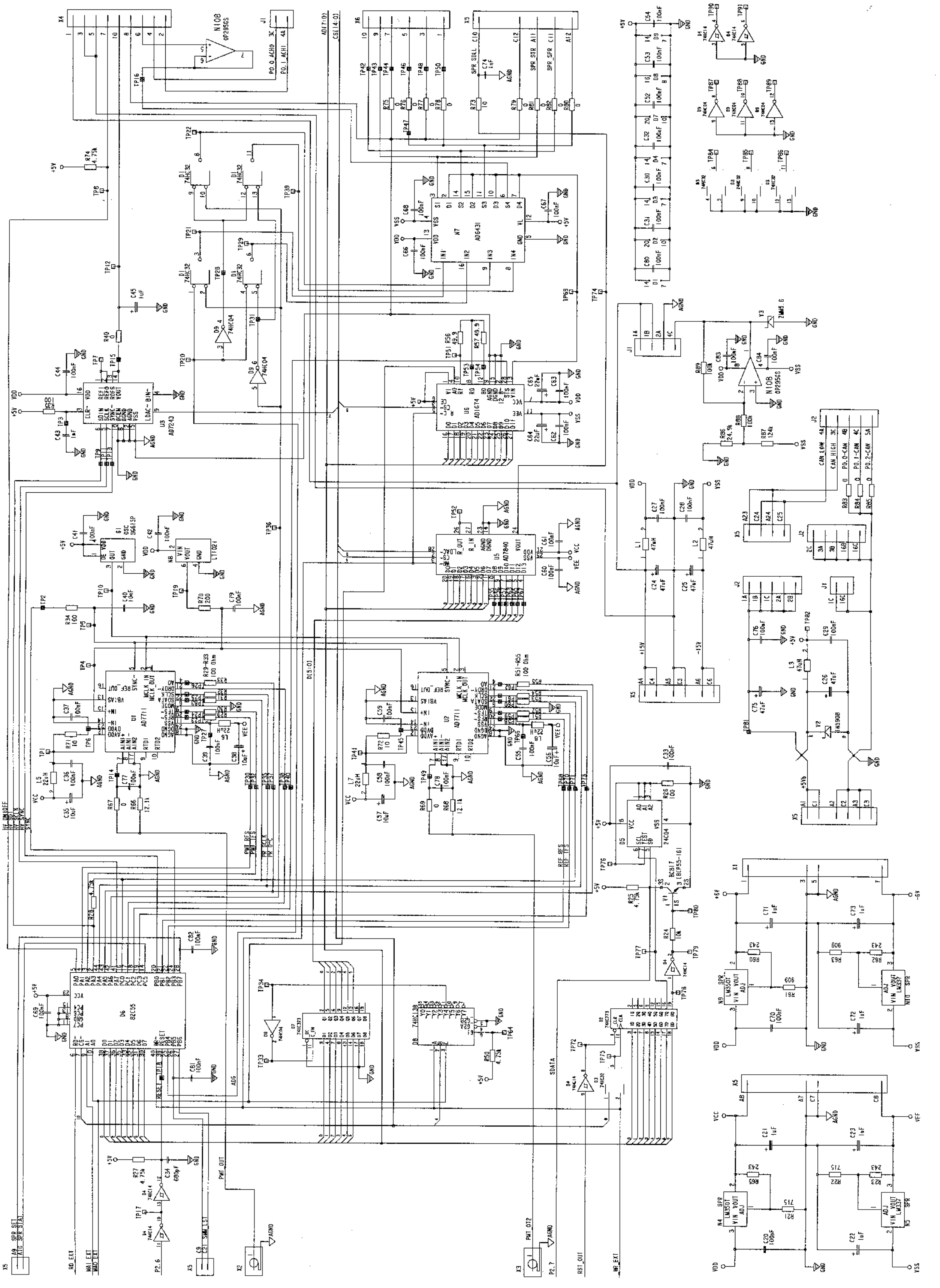

X4
J1
X6
X5
N10B OP295GS
N7 AD6431
U3 AD7243
U6 AD1674
U5 AD7840
U1 AD7711
U2 AD7711
G1 OSC 5661SP
N8 LT1021
D6 82C55
D7 74HC373
D8 74HC138
D5 24C04
D1 74HC32
D9 74HC04
V1 BC817
V2 LM3908
N9 LM350T
N10 LM337
N4 LM350T
N5 LM337
X1
X2
X3
+5V
GND
AGND
VDD
VSS
VCC
VEE
VFF
+6V
-6V
+15V
-15V
SPR_SET
RD_EXT
WR_EXT
PMT_OUT
PMT_OT2
RST_OUT
SDATA

Fig. 5-4-5s

5.4.5 PCB Detection Module BP1 Part 2 of 3 Printed Circuit Diagram

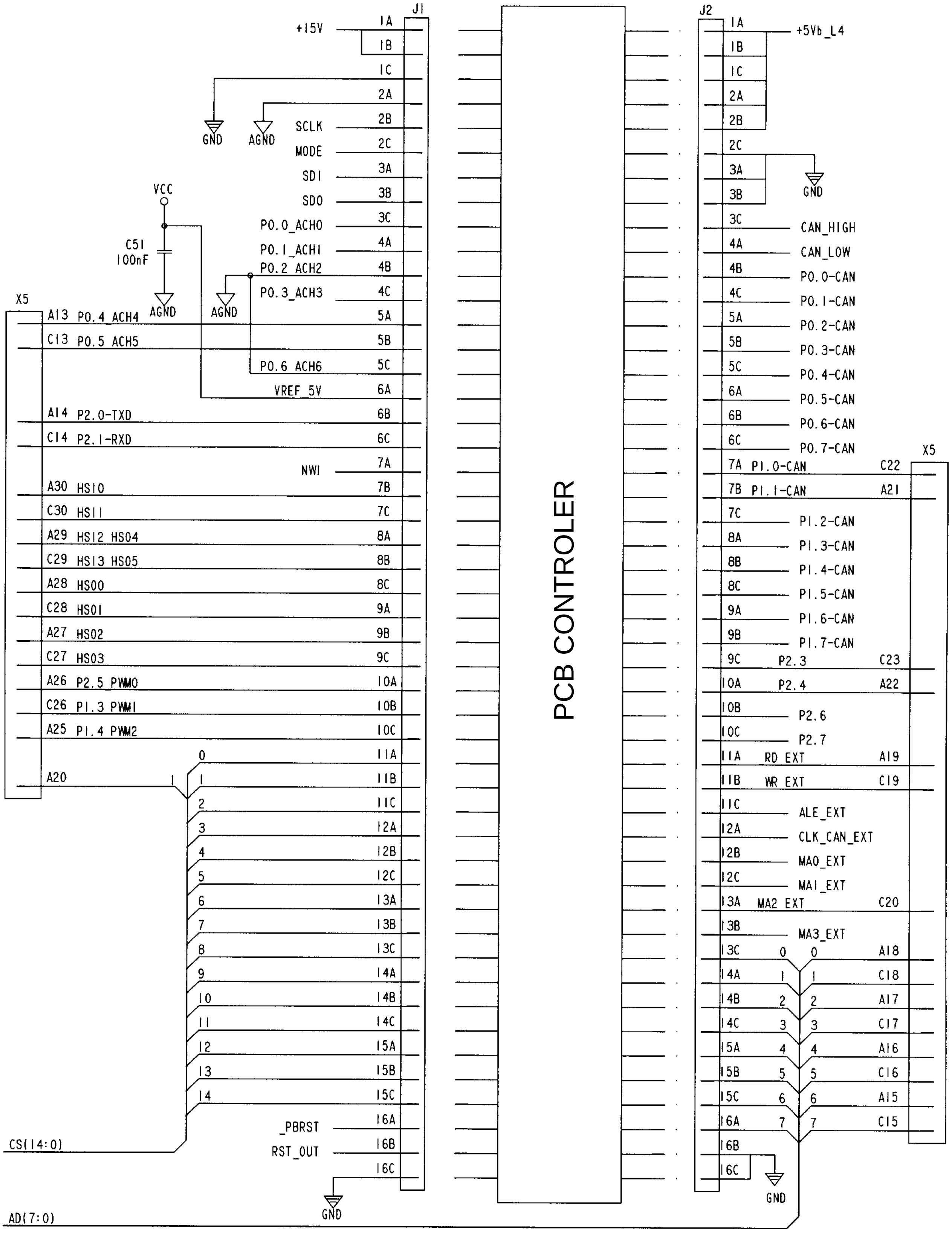

J1
J2
X5
PCB CONTROLER
+15V
GND
AGND
VCC
C51
100nF
SCLK
MODE
SDI
SDO
P0.0_ACH0
P0.1_ACH1
P0.2_ACH2
P0.3_ACH3
A13 P0.4_ACH4
C13 P0.5_ACH5
P0.6_ACH6
VREF_5V
A14 P2.0-TXD
C14 P2.1-RXD
NWI
A30 HSI0
C30 HSI1
A29 HSI2_HSO4
C29 HSI3_HSO5
A28 HSO0
C28 HSO1
A27 HSO2
C27 HSO3
A26 P2.5_PWM0
C26 P1.3_PWM1
A25 P1.4_PWM2
A20
_PBRST
RST_OUT
CS(14:0)
AD(7:0)
1A
1B
1C
2A
2B
2C
3A
3B
3C
4A
4B
4C
5A
5B
5C
6A
6B
6C
7A
7B
7C
8A
8B
8C
9A
9B
9C
10A
10B
10C
11A
11B
11C
12A
12B
12C
13A
13B
13C
14A
14B
14C
15A
15B
15C
16A
16B
16C
+5Vb_L4
CAN_HIGH
CAN_LOW
P0.0-CAN
P0.1-CAN
P0.2-CAN
P0.3-CAN
P0.4-CAN
P0.5-CAN
P0.6-CAN
P0.7-CAN
P1.0-CAN C22
P1.1-CAN A21
P1.2-CAN
P1.3-CAN
P1.4-CAN
P1.5-CAN
P1.6-CAN
P1.7-CAN
P2.3 C23
P2.4 A22
P2.6
P2.7
RD_EXT A19
WR_EXT C19
ALE_EXT
CLK_CAN_EXT
MA0_EXT
MA1_EXT
MA2_EXT C20
MA3_EXT
A18
C18
A17
C17
A16
C16
A15
C15

Fig. 5-4-52s

5.4.5 PCB Detection Module BP1 Part 3 of 3 Layout Diagram

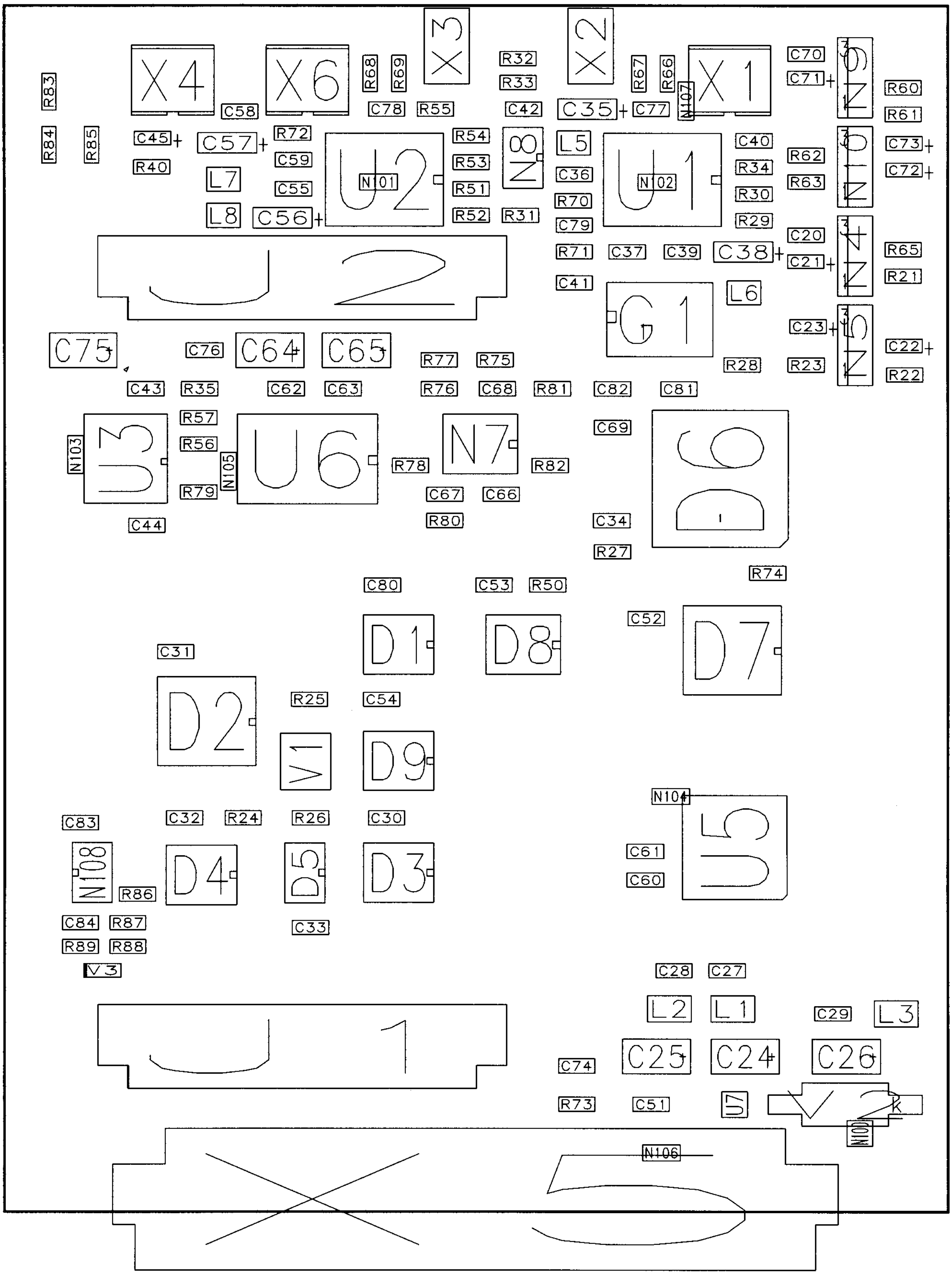

R83
X4
X6
R68
R69
X3
R32
R33
X2
R67
R66
N107
X1
C70
C71
N9
R60
R61
C58
C78
R55
C42
C35
C77
R84
R85
C45
C57
R72
R54
R53
R51
R52
C59
C55
U2
N101
N8
L5
C36
R70
C79
R31
U1
N102
C40
R34
R30
R29
R62
R63
N10
C73
C72
R40
L7
L8
C56
J2
R71
C37
C39
C38
C41
C20
C21
N4
R65
R21
G1
L6
C75
C76
C64
C65
R77
R75
C23
N5
C22
R28
R23
R22
C43
R35
C62
C63
R76
C68
R81
C82
C81
R57
R56
R79
N103
U3
N105
U6
R78
N7
R82
C67
C66
C69
D6
R80
C34
R27
C44
R74
C80
C53
R50
C52
D7
D1
D8
C31
D2
R25
C54
V1
D9
N104
U5
C83
C32
R24
R26
C30
C61
C60
N108
R86
D4
D5
D3
C84
R87
R89
R88
C33
V3
C28
C27
L2
L1
C29
L3
J1
C74
C25
C24
C26
R73
C51
U7
V2
N100
N106
X5

Fig. 5-4-5b

5.4.6 PCB Dilutor Sample BP2 Part 1 of 1 Functional Diagram

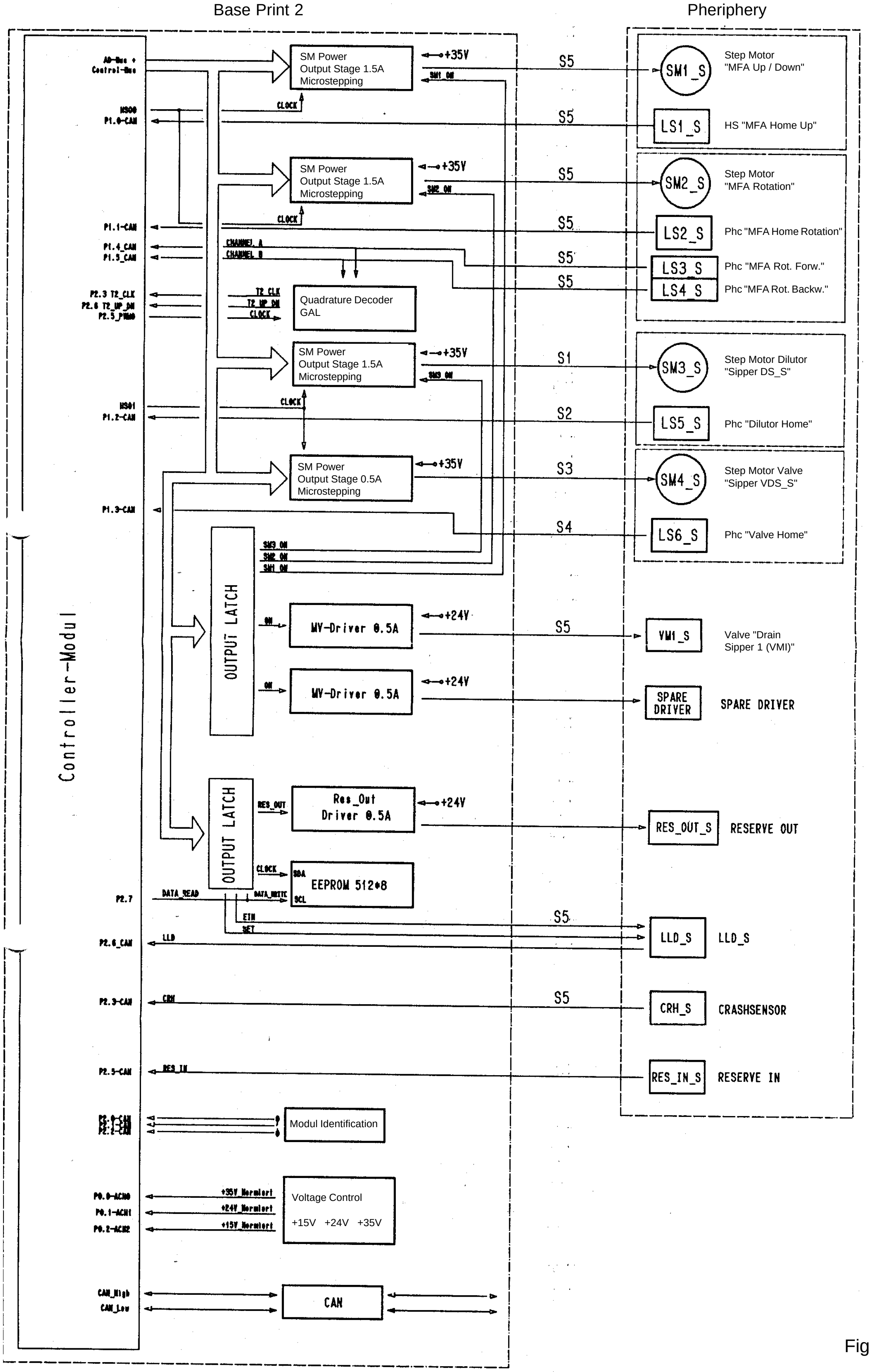

Base Print 2
Pheriphery
AD-Bus + Control-Bus
HS00
P1.0-CAN
P1.1-CAN
P1.4_CAN
P1.5_CAN
P2.3 T2_CLK
P2.6 T2_UP_DN
P2.5_PWM
HS01
P1.2-CAN
P1.3-CAN
P2.7
P2.6_CAN
P2.3-CAN
P2.5-CAN
P2.0-CAN
P2.1-CAN
P2.2-CAN
P0.0-ACH0
P0.1-ACH1
P0.2-ACH2
CAN_High
CAN_Low
Controller-Modul
SM Power Output Stage 1.5A Microstepping
+35V
SM1_ON
CLOCK
SM Power Output Stage 1.5A Microstepping
+35V
SM2_ON
CLOCK
CHANNEL A
CHANNEL B
T2_CLK
T2_UP_DN
CLOCK
Quadrature Decoder GAL
SM Power Output Stage 1.5A Microstepping
+35V
SM3_ON
CLOCK
SM Power Output Stage 0.5A Microstepping
+35V
OUTPUT LATCH
SM3_ON
SM2_ON
SM1_ON
ON
MV-Driver 0.5A
+24V
ON
MV-Driver 0.5A
+24V
OUTPUT LATCH
RES_OUT
Res_Out Driver 0.5A
+24V
CLOCK
SDA
EEPROM 512*8
SCL
DATA_READ
DATA_WRITE
EIN
SET
LLD
CRH
RES_IN
Modul Identification
+35V_Normiert
+24V_Normiert
+15V_Normiert
Voltage Control
+15V +24V +35V
CAN
S5
S5
S5
S5
S5
S5
S1
S2
S3
S4
S5
S5
S5
SM1_S
Step Motor "MFA Up / Down"
LS1_S
HS "MFA Home Up"
SM2_S
Step Motor "MFA Rotation"
LS2_S
Phc "MFA Home Rotation"
LS3_S
Phc "MFA Rot. Forw."
LS4_S
Phc "MFA Rot. Backw."
SM3_S
Step Motor Dilutor "Sipper DS_S"
LS5_S
Phc "Dilutor Home"
SM4_S
Step Motor Valve "Sipper VDS_S"
LS6_S
Phc "Valve Home"
VM1_S
Valve "Drain Sipper 1 (VMI)"
SPARE DRIVER
SPARE DRIVER
RES_OUT_S
RESERVE OUT
LLD_S
LLD_S
CRH_S
CRASHSENSOR
RES_IN_S
RESERVE IN

Fig. 5-4-6

5.4.7 PCB Temp Module BP3 Part 1 of 4
Printed Circuit Diagram

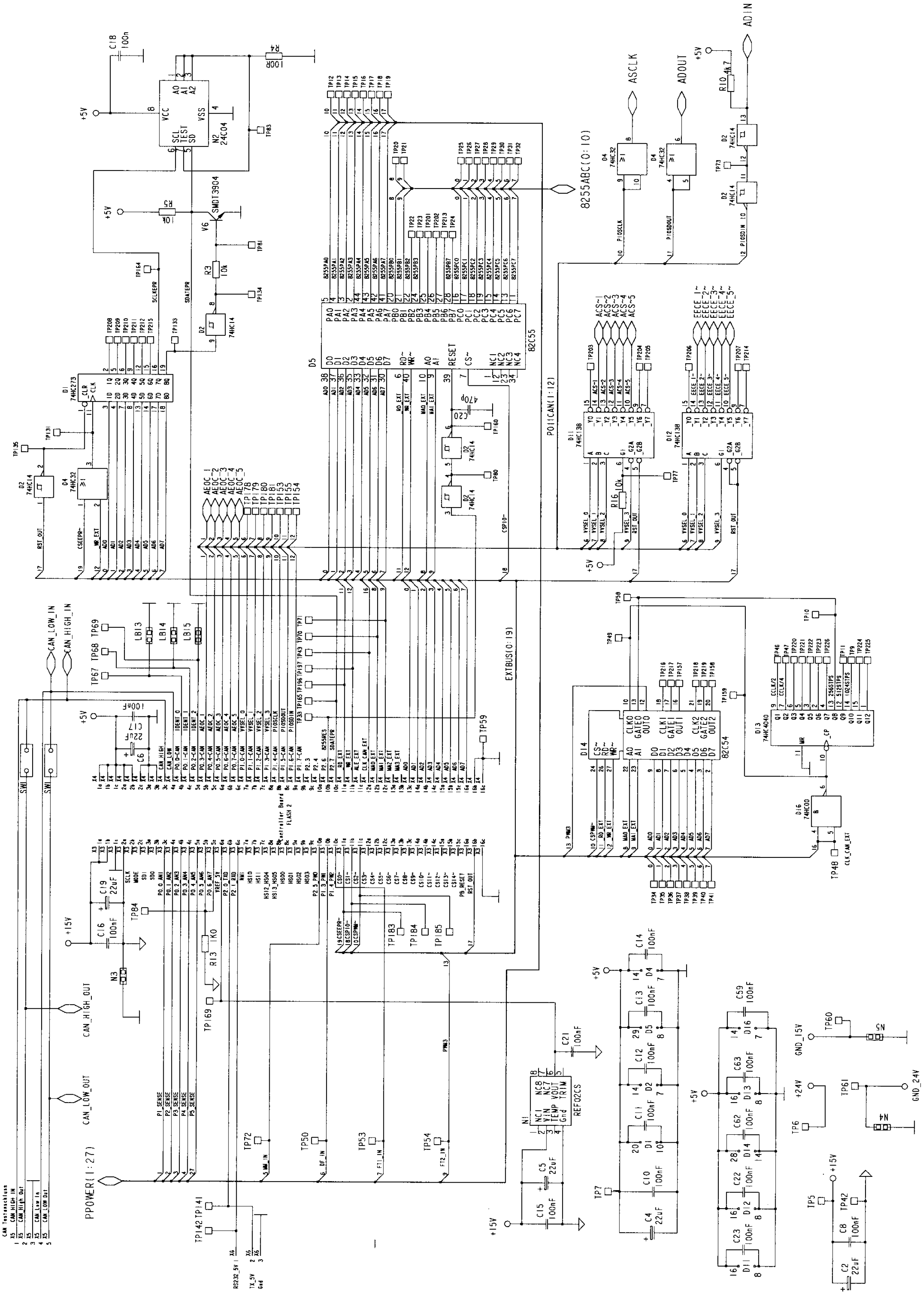


Fig. 5-4-7s

5.4.7 PCB Temp Module BP3 Part 2 of 4
Printed Circuit Diagram

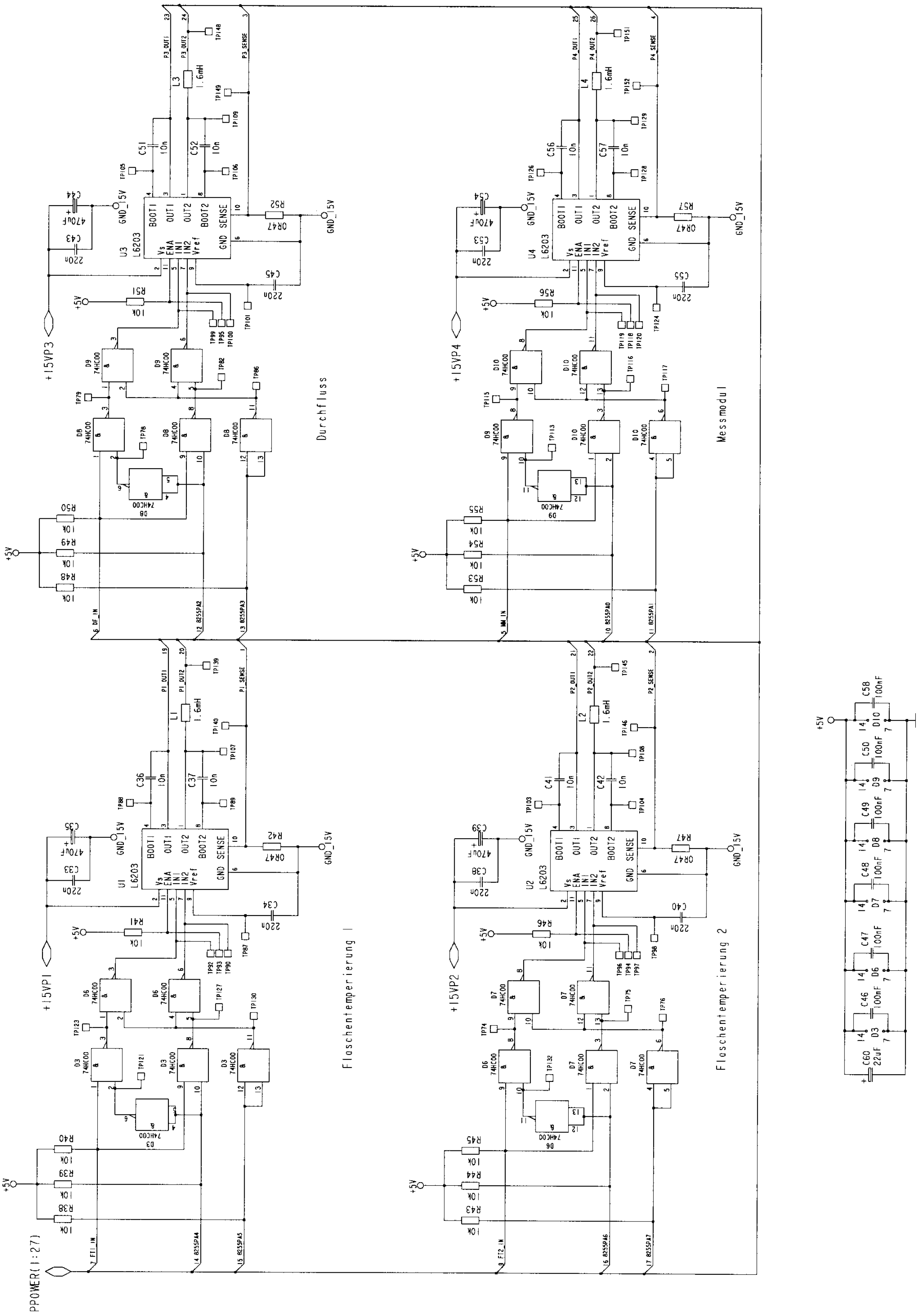

Durchfluss
Messmodul
Floschentemperierung 1
Floschentemperierung 2
+15VP1
+15VP2
+15VP3
+15VP4
PPOWER(1:27)
U1 L6203
U2 L6203
U3 L6203
U4 L6203
L1 1.6mH
L2 1.6mH
L3 1.6mH
L4 1.6mH
GND_15V
+5V
74HC00

Fig. 5-4-72s

5.4.7 PCB Temp Module BP3 Part 3 of 4 Printed Circuit Diagram

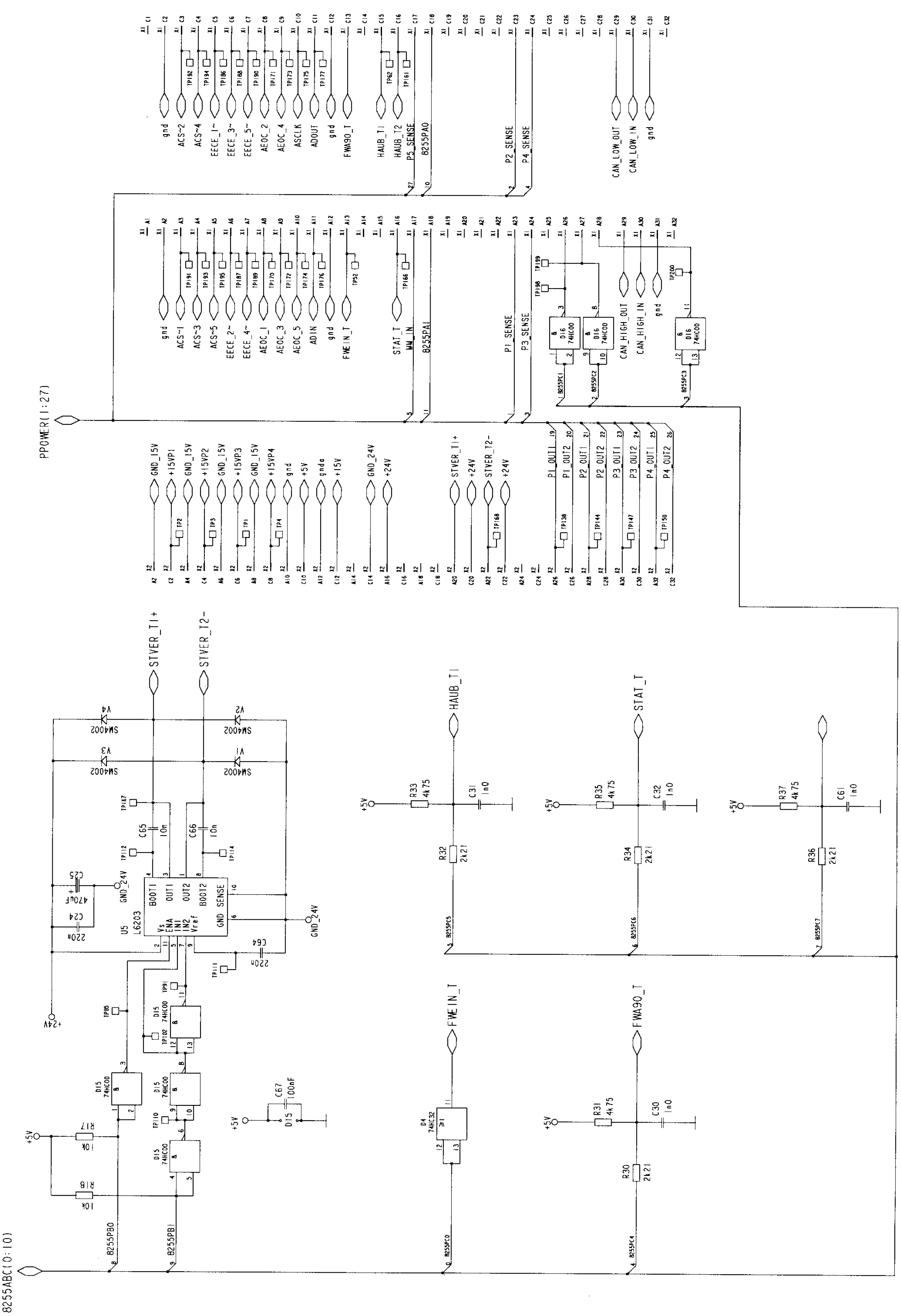

PPOWER(1:27)
8255ABC(0:10)
gnd
ACS-2
ACS-4
EECE_1~
EECE_3~
EECE_5~
AEOC_2
AEOC_4
ASCLK
ADOUT
FWA90_T
HAUB_T1
HAUB_T2
P5_SENSE
8255PA0
P2_SENSE
P4_SENSE
CAN_LOW_OUT
CAN_LOW_IN
ACS-1
ACS-3
ACS-5
EECE_2~
EECE_4~
AEOC_1
AEOC_3
AEOC_5
ADIN
FWEIN_T
STAT_T
MM_IN
8255PA1
P1_SENSE
P3_SENSE
CAN_HIGH_OUT
CAN_HIGH_IN
D16 74HC00
GND_15V
+15VP1
+15VP2
+15VP3
+15VP4
+5V
gnda
+15V
GND_24V
+24V
STVER_T1+
STVER_T2-
P1_OUT1
P1_OUT2
P2_OUT1
P2_OUT2
P3_OUT1
P3_OUT2
P4_OUT1
P4_OUT2
X1
X2
V1
V2
V3
V4
SM4002
C65 10n
C66 10n
C25 470uF
C24 220n
C64 220n
U5 L6203
Vs
ENA
IN1
IN2
Vref
GND
BOOT1
OUT1
OUT2
BOOT2
SENSE
D15 74HC00
R17 10k
R18 10k
8255PB0
8255PB1
C67 100nF
D4 74HC32
HAUB_T1
R33 4k75
C31 1n0
R32 2k21
R35 4k75
C32 1n0
R34 2k21
R37 4k75
C61 1n0
R36 2k21
R31 4k75
C30 1n0
R30 2k21
8255PC0
8255PC4
8255PC5
8255PC6
8255PC7

Fig. 5-4-73s

5.4.7 PCB Temp Module BP3 Part 4 of 4 Layout Diagram

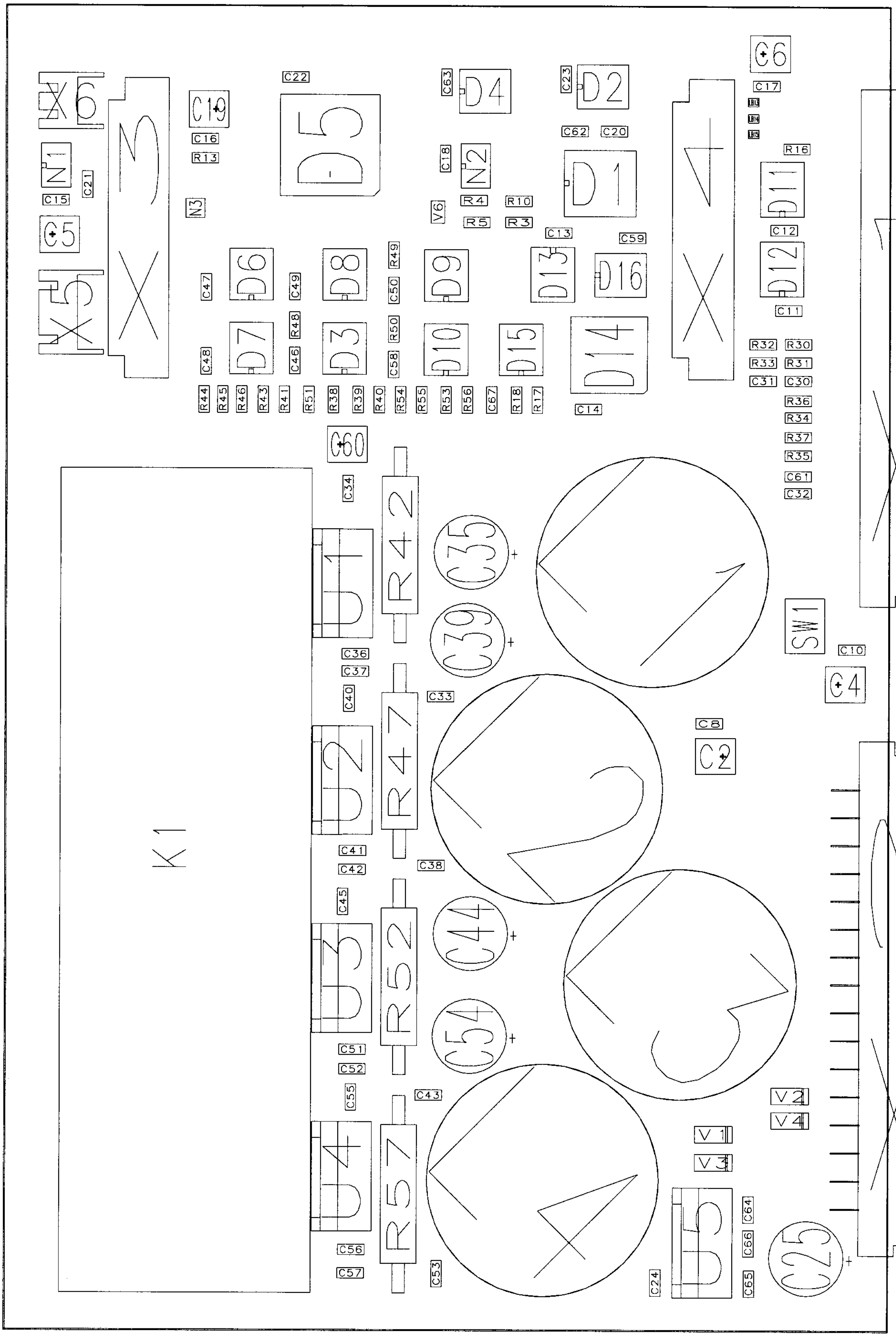

X6
X3
C19
C22
D5
C63
D4
C23
D2
C6
C17
C16
R13
N1
C21
C15
C5
N3
X5
C18
N2
C62
C20
D1
X4
R16
D11
R4
R10
V6
R5
R3
C13
C59
C12
C47
D6
C49
D8
R49
D9
D13
D16
D12
C11
R48
R50
C50
C48
D7
C46
D3
C58
D10
D15
D14
R32
R30
R33
R31
C31
C30
R44
R45
R46
R43
R41
R51
R38
R39
R40
R54
R55
R53
R56
C67
R18
R17
C14
R36
R34
R37
R35
C61
C32
C60
C34
R42
C35
U1
1
C39
SW1
C10
C36
C37
C4
C40
C33
C8
R47
U2
C2
2
K1
C41
C42
C38
C45
C44
R52
U3
3
C54
C51
C52
C55
C43
V2
V4
U4
R57
4
V1
V3
C64
U5
C66
C25
C56
C57
C53
C24
C65

Fig. 5-4-7b

5.4.8 PCB Rotor/Rotor Module BP4 Part 1 of 1 Functional Diagram

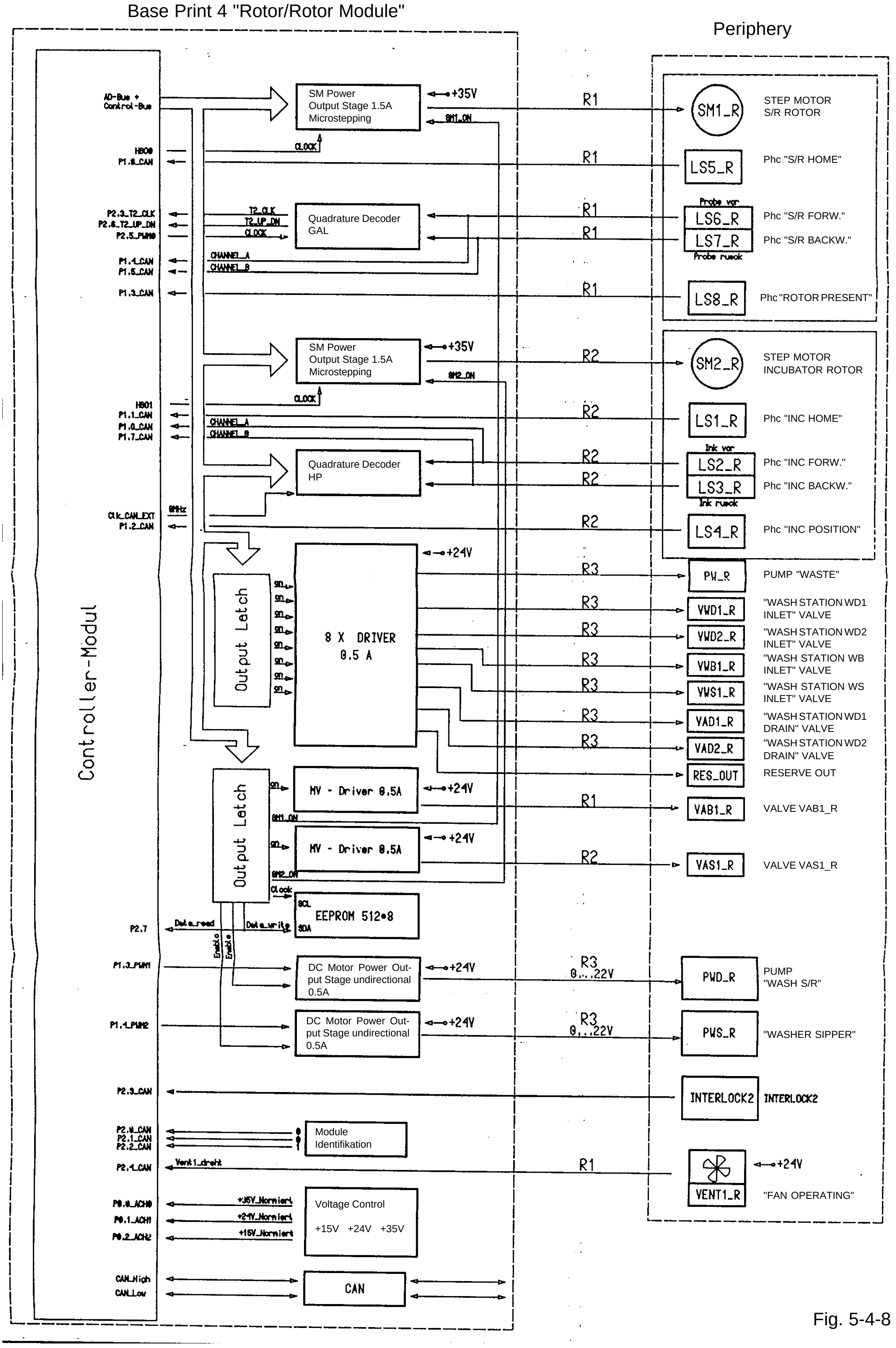

Base Print 4 "Rotor/Rotor Module"
Periphery
Controller-Modul
AD-Bus + Control-Bus
H800
P1.0_CAN
P2.3_T2_CLK
P2.6_T2_UP_DN
P2.5_PWM0
P1.4_CAN
P1.5_CAN
P1.3_CAN
H801
P1.1_CAN
P1.0_CAN
P1.7_CAN
Clk_CAN_EXT
8MHz
P1.2_CAN
P2.7
Data_read
Data_write
Enable
Enable
P1.3_PWM1
P1.4_PWM2
P2.3_CAN
P2.0_CAN
P2.1_CAN
P2.2_CAN
P2.4_CAN
Venti_dreht
P0.0_ACH0
P0.1_ACH1
P0.2_ACH2
+35V_Normiert
+24V_Normiert
+15V_Normiert
CAN_High
CAN_Low
SM Power Output Stage 1.5A Microstepping
+35V
SM1_ON
CLOCK
T2_CLK
T2_UP_DN
CLOCK
Quadrature Decoder GAL
CHANNEL_A
CHANNEL_B
SM Power Output Stage 1.5A Microstepping
+35V
SM2_ON
CLOCK
CHANNEL_A
CHANNEL_B
Quadrature Decoder HP
Output Latch
8 X DRIVER 0.5 A
+24V
on
Output Latch
MV - Driver 0.5A
+24V
SM1_ON
MV - Driver 0.5A
+24V
SM2_ON
Clock
SCL
EEPROM 512*8
SDA
DC Motor Power Output Stage undirectional 0.5A
+24V
DC Motor Power Output Stage undirectional 0.5A
+24V
Module Identifikation
Voltage Control
+15V +24V +35V
CAN
R1
R1
R1
R1
R1
R2
R2
R2
R2
R2
R3
R3
R3
R3
R3
R3
R3
R1
R2
R3 0...22V
R3 0...22V
R1
SM1_R
STEP MOTOR S/R ROTOR
LS5_R
Phc "S/R HOME"
Probe vor
LS6_R
Phc "S/R FORW."
LS7_R
Phc "S/R BACKW."
Probe rueck
LS8_R
Phc "ROTOR PRESENT"
SM2_R
STEP MOTOR INCUBATOR ROTOR
LS1_R
Phc "INC HOME"
Ink vor
LS2_R
Phc "INC FORW."
LS3_R
Phc "INC BACKW."
Ink rueck
LS4_R
Phc "INC POSITION"
PW_R
PUMP "WASTE"
VWD1_R
"WASH STATION WD1 INLET" VALVE
VWD2_R
"WASH STATION WD2 INLET" VALVE
VWB1_R
"WASH STATION WB INLET" VALVE
VWS1_R
"WASH STATION WS INLET" VALVE
VAD1_R
"WASH STATION WD1 DRAIN" VALVE
VAD2_R
"WASH STATION WD2 DRAIN" VALVE
RES_OUT
RESERVE OUT
VAB1_R
VALVE VAB1_R
VAS1_R
VALVE VAS1_R
PWD_R
PUMP "WASH S/R"
PWS_R
"WASHER SIPPER"
INTERLOCK2
INTERLOCK2
VENT1_R
+24V
"FAN OPERATING"

Fig. 5-4-8

5.4.9 PCB Dilutor Reagent BP5 Part 1 of 1 Functional Diagram

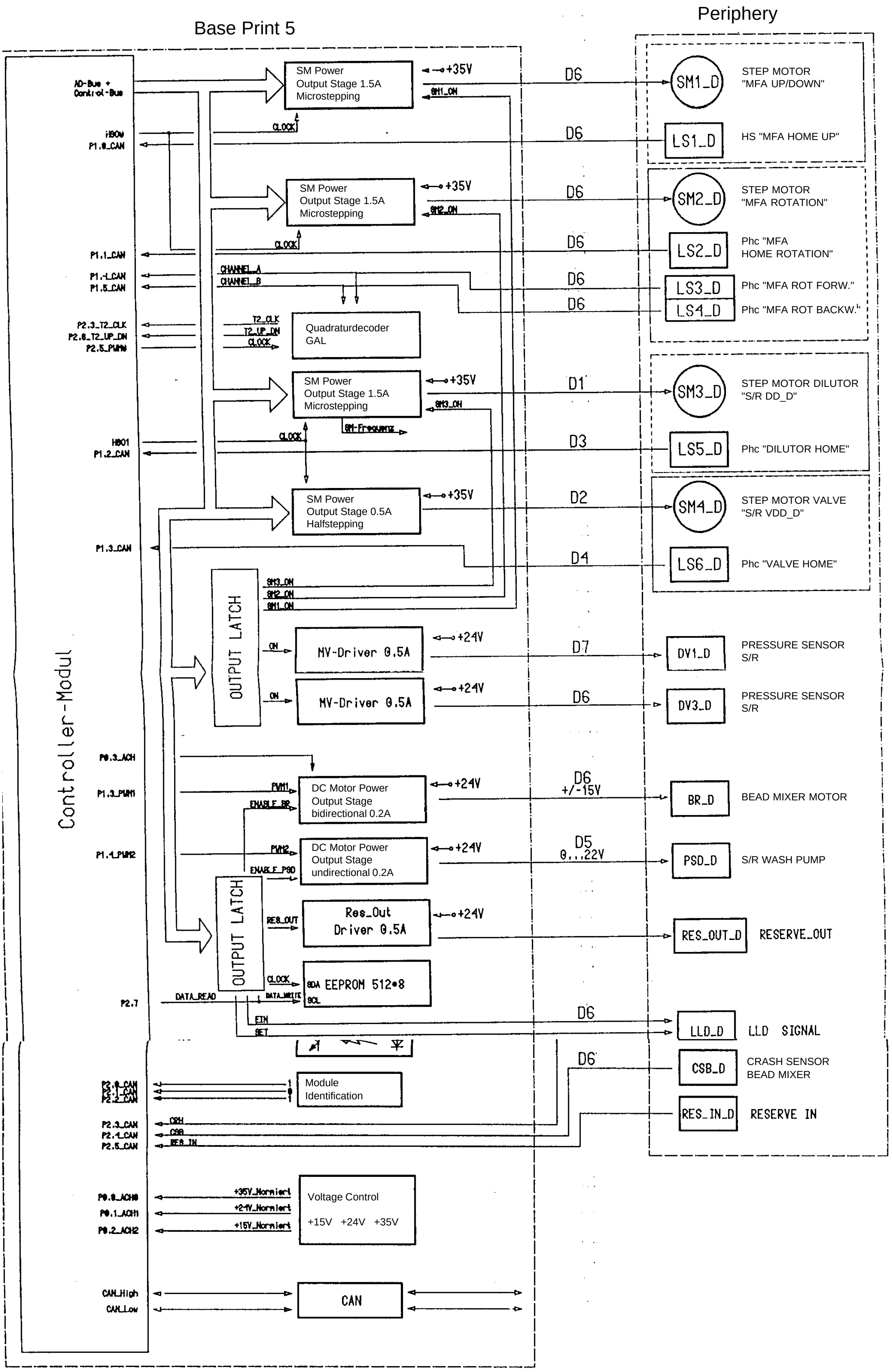

Base Print 5
Periphery
AD-Bus + Control-Bus
H80W
P1.0_CAN
P1.1_CAN
P1.4_CAN
P1.5_CAN
P2.3_T2_CLK
P2.6_T2_UP_DN
P2.5_PWM
H801
P1.2_CAN
P1.3_CAN
Controller-Modul
P0.3_ACH
P1.3_PWM1
P1.4_PWM2
P2.7
P2.0_CAN
P2.1_CAN
P2.2_CAN
P2.3_CAN
P2.4_CAN
P2.5_CAN
P0.0_ACH0
P0.1_ACH1
P0.2_ACH2
CAN_High
CAN_Low
SM Power Output Stage 1.5A Microstepping
+35V
SM1_ON
CLOCK
SM Power Output Stage 1.5A Microstepping
+35V
SM2_ON
CLOCK
CHANNEL_A
CHANNEL_B
T2_CLK
T2_UP_DN
CLOCK
Quadraturdecoder GAL
SM Power Output Stage 1.5A Microstepping
+35V
SM3_ON
SM-Frequenz
CLOCK
SM Power Output Stage 0.5A Halfstepping
+35V
OUTPUT LATCH
SM3_ON
SM2_ON
SM1_ON
ON
MV-Driver 0.5A
+24V
ON
MV-Driver 0.5A
+24V
PWM1
ENABLE_BR
DC Motor Power Output Stage bidirectional 0.2A
+24V
PWM2
ENABLE_PSD
DC Motor Power Output Stage undirectional 0.2A
+24V
OUTPUT LATCH
RES_OUT
Res_Out Driver 0.5A
+24V
CLOCK
SDA
SCL
EEPROM 512*8
DATA_READ
DATA_WRITE
ETN
SET
Module Identification
CRH
CSB
RES_IN
+35V_Normiert
+24V_Normiert
+15V_Normiert
Voltage Control
+15V +24V +35V
CAN
D6
D6
D6
D6
D6
D6
D1
D3
D2
D4
D7
D6
D6 +/-15V
D5 0...22V
D6
D6
SM1_D
STEP MOTOR "MFA UP/DOWN"
LS1_D
HS "MFA HOME UP"
SM2_D
STEP MOTOR "MFA ROTATION"
LS2_D
Phc "MFA HOME ROTATION"
LS3_D
Phc "MFA ROT FORW."
LS4_D
Phc "MFA ROT BACKW."
SM3_D
STEP MOTOR DILUTOR "S/R DD_D"
LS5_D
Phc "DILUTOR HOME"
SM4_D
STEP MOTOR VALVE "S/R VDD_D"
LS6_D
Phc "VALVE HOME"
DV1_D
PRESSURE SENSOR S/R
DV3_D
PRESSURE SENSOR S/R
BR_D
BEAD MIXER MOTOR
PSD_D
S/R WASH PUMP
RES_OUT_D
RESERVE_OUT
LLD_D
LLD SIGNAL
CSB_D
CRASH SENSOR BEAD MIXER
RES_IN_D
RESERVE IN

Fig. 5-4-9

5.4.10 PCB Incubator Heater BP6 Part 1 of 3 Printed Circuit Diagram

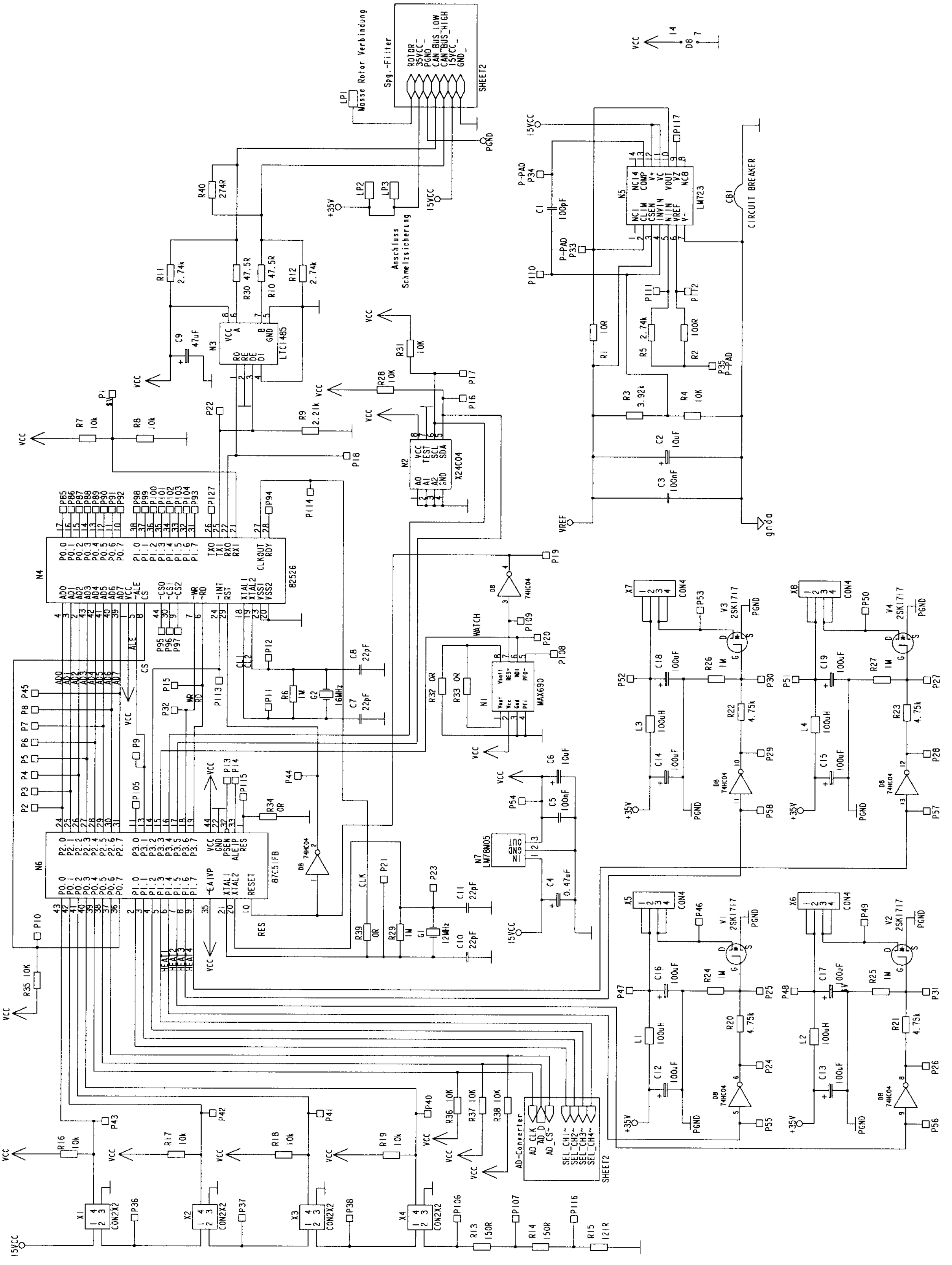

SHEET2
ROTOR
35VCC_
PGND_
CAN_BUS_LOW
CAN_BUS_HIGH
15VCC_
GND_
Spg.-Filter
LP1 Masse Rotor Verbindung
PGND
LP2
LP3
+35V
15VCC
Anschluss Schmelzsicherung
R40 274R
R11 2.74k
R30 47.5R
R10 47.5R
R12 2.74k
N3 LTC1485
C9 47uF
R31 10K
R28 10K
R9 2.21k
N2 X24C04
R7 10k
R8 10k
P1 5V
N4 82526
N6 87C51FB
N5 LM723
C1 100pF
P-PAD
R1 10R
R5 2.74k
R2 100R
R3 3.92k
R4 10K
C2 10uF
C3 100nF
VREF
gnda
CB1 CIRCUIT BREAKER
D8 74HC04
N1 MAX690
R32 0R
R33 0R
WATCH
C8 22pF
C7 22pF
R6 1M
G2 16MHz
C6 10uF
C5 100nF
N7 LM78M05
C4 0.47uF
C11 22pF
C10 22pF
R29 1M
G1 12MHz
R39 0R
CLK
RES
R34 0R
R35 10K
X5 CON4
X6 CON4
X7 CON4
X8 CON4
V1 2SK1717
V2 2SK1717
V3 2SK1717
V4 2SK1717
C14 100uF
C15 100uF
C18 100uF
C19 100uF
L3 100uH
L4 100uH
R26 1M
R27 1M
R22 4.75k
R23 4.75k
C16 100uF
C17 100uF
L1 100uH
L2 100uH
R24 1M
R25 1M
R20 4.75k
R21 4.75k
C12 100uF
C13 100uF
HEAT1
HEAT2
HEAT3
HEAT4
R36 10K
R37 10K
R38 10K
AD-Converter
AD_CLK
AD_D
AD_CS~
SEL_CH1~
SEL_CH2~
SEL_CH3~
SEL_CH4~
R16 10k
R17 10k
R18 10k
R19 10k
X1 CON2X2
X2 CON2X2
X3 CON2X2
X4 CON2X2
R13 150R
R14 150R
R15 121R
VCC
PGND
+35V
15VCC

Fig. 5-4-10s

5.4.10 PCB Incubator Heater BP6 Part 2 of 3 Printed Circuit Diagram

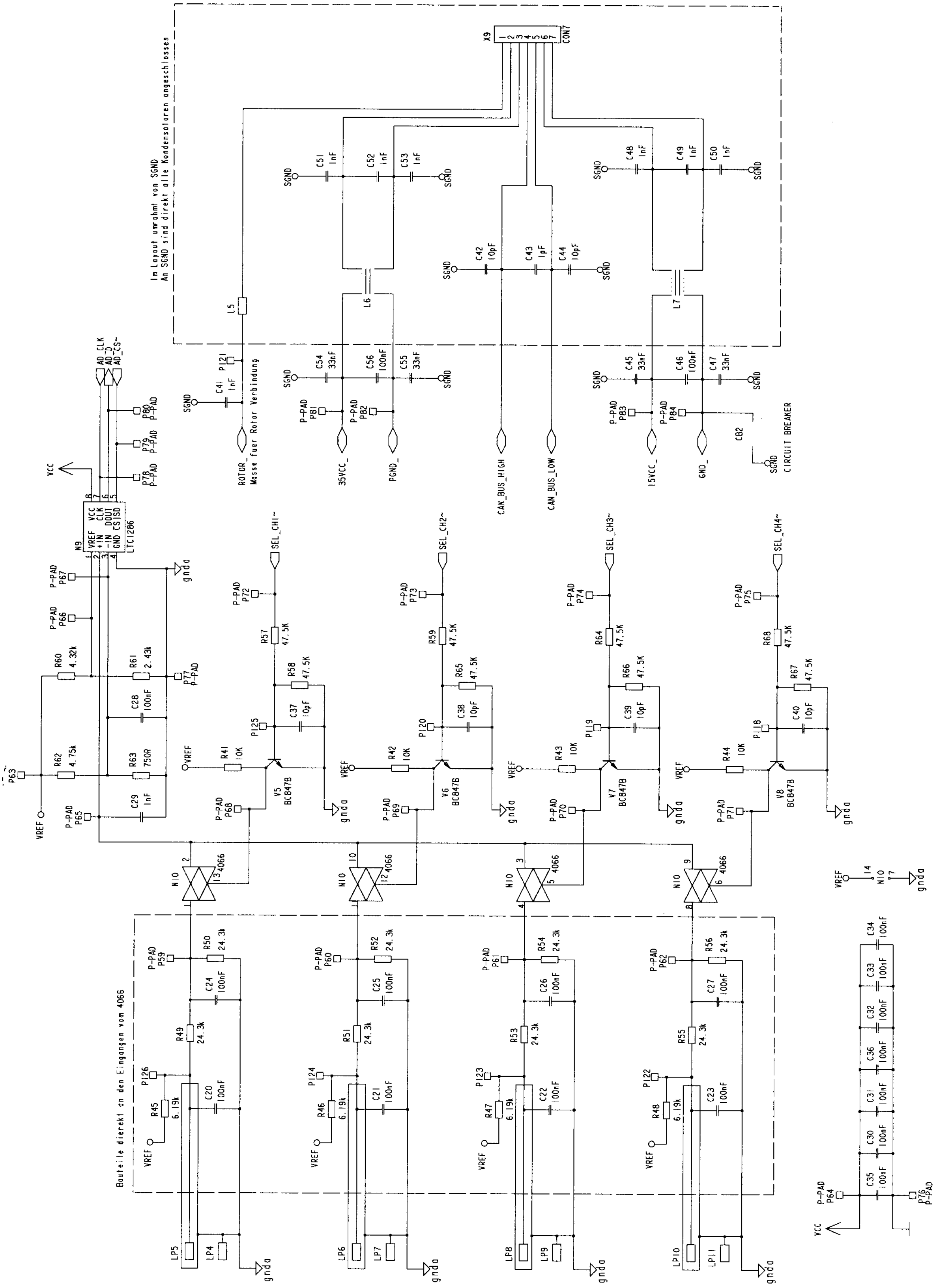

Im Layout umrahmt von SGND
An SGND sind direkt alle Kondensatoren angeschlossen
X9
CON7
C51 1nF
C52 1nF
C53 1nF
C48 1nF
C49 1nF
C50 1nF
C42 10pF
C43 1pF
C44 10pF
L5
L6
L7
SGND
P121
C41 1nF
C54 33nF
C56 100nF
C55 33nF
C45 33nF
C46 100nF
C47 33nF
P-PAD P81
P-PAD P82
P-PAD P83
P-PAD P84
CB2
CIRCUIT BREAKER
ROTOR_
Masse fuer Rotor Verbindung
35VCC_
PGND_
CAN_BUS_HIGH
CAN_BUS_LOW
15VCC_
GND_
AD_CLK
AD_D
AD_CS~
P80 P-PAD
P79 P-PAD
P78 P-PAD
VCC
N9
LTC1286
VREF VCC
+IN CLK
-IN DOUT
GND CS1SD
gnda
P-PAD P67
P-PAD P66
R60 4.32k
R61 2.43k
P77 P-PAD
C28 100nF
R62 4.75k
R63 750R
C29 1nF
P63
P-PAD P65
VREF
SEL_CH1~
SEL_CH2~
SEL_CH3~
SEL_CH4~
P-PAD P72
P-PAD P73
P-PAD P74
P-PAD P75
R57 47.5K
R58 47.5K
R59 47.5K
R65 47.5K
R64 47.5K
R66 47.5K
R68 47.5K
R67 47.5K
C37 10pF
C38 10pF
C39 10pF
C40 10pF
P125
P120
P119
P118
R41 10K
R42 10K
R43 10K
R44 10K
V5 BC847B
V6 BC847B
V7 BC847B
V8 BC847B
P-PAD P68
P-PAD P69
P-PAD P70
P-PAD P71
N10
4066
VREF 14 N10 7 gnda
Bauteile dierekt an den Eingangen vom 4066
P-PAD P59
P-PAD P60
P-PAD P61
P-PAD P62
R50 24.3k
R52 24.3k
R54 24.3k
R56 24.3k
C24 100nF
C25 100nF
C26 100nF
C27 100nF
R49 24.3k
R51 24.3k
R53 24.3k
R55 24.3k
P126
P124
P123
P122
R45 6.19k
R46 6.19k
R47 6.19k
R48 6.19k
C20 100nF
C21 100nF
C22 100nF
C23 100nF
LP5
LP4
LP6
LP7
LP8
LP9
LP10
LP11
C34 100nF
C33 100nF
C32 100nF
C36 100nF
C31 100nF
C30 100nF
C35 100nF
P-PAD P64
P76 P-PAD

Fig. 5-4-102s

5.4.10 PCB Incubator Heater BP6 Part 3 of 3 Layout Diagram

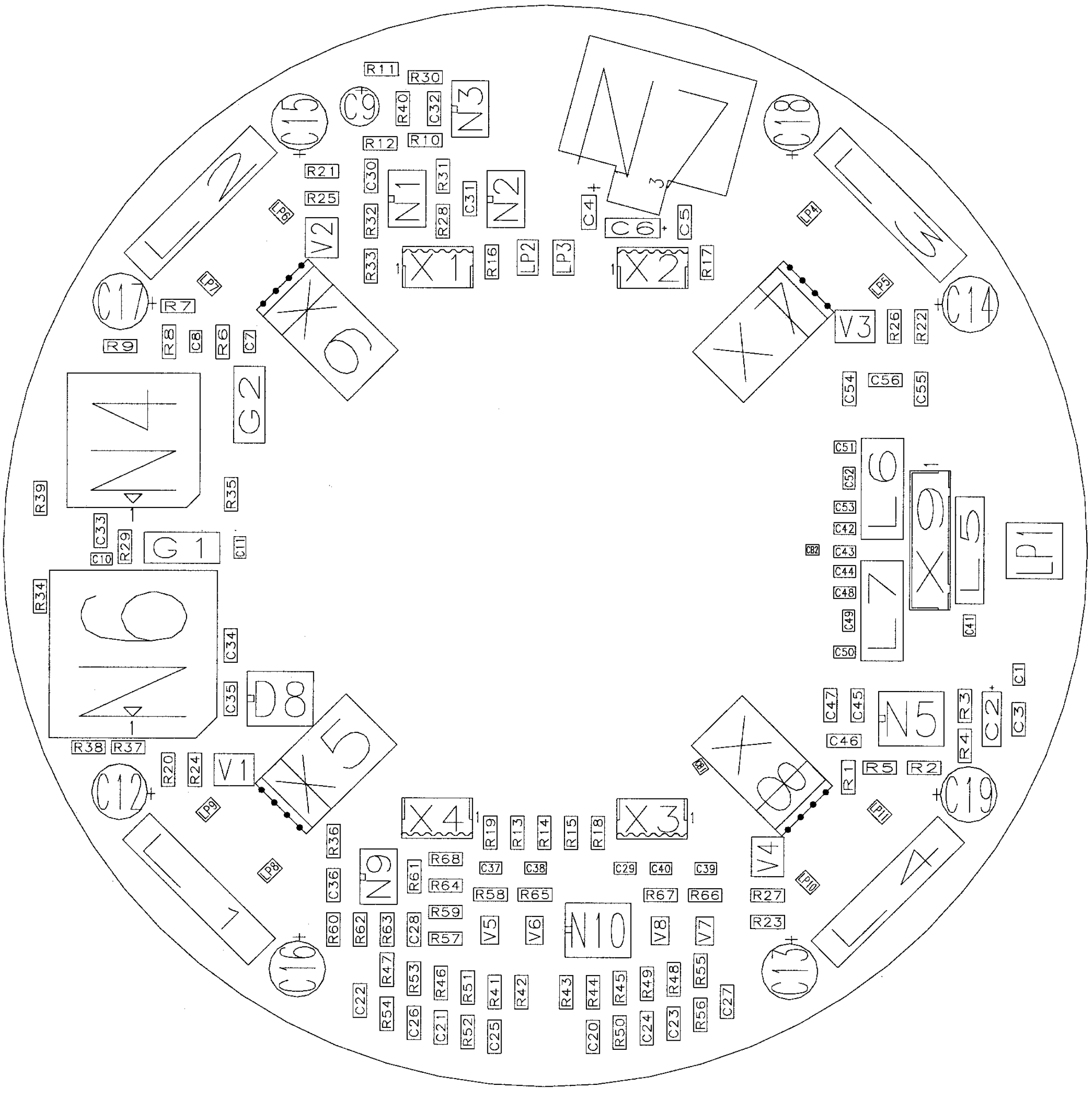

R11
R30
C9
R40
C32
N3
C15
R12
R10
N7
C18
R21
C30
N1
R31
C31
N2
R25
L2
V2
R32
R28
C4
C6
C5
L3
LP4
R33
X1
R16
LP2
LP3
X2
R17
LP7
C17
R7
X6
X7
LP5
C14
R9
R8
C8
R6
C7
V3
R26
R22
G2
C54
C56
C55
N4
C51
L6
C52
R39
R35
X9
L5
LP1
C53
C42
C33
G1
C11
C43
R29
C10
C44
R34
C48
N6
C49
C41
C34
C50
C1
C47
C45
N5
R3
C2
C3
C35
D8
X5
C46
R4
R38
R37
R20
R24
V1
X8
R1
R5
R2
C12
C19
LP9
LP11
X4
R19
R13
R14
R15
R18
X3
V4
R36
L1
L4
LP8
R68
C37
C38
C29
C40
C39
LP10
N9
R61
R64
R58
R65
R67
R66
R27
C36
R59
R23
R60
R62
R63
C28
R57
V5
V6
N10
V8
V7
C16
C13
R47
R53
R46
R51
R41
R42
R43
R44
R45
R49
R48
R55
C22
R54
C26
C21
R52
C25
C20
R50
C24
C23
R56
C27

Fig. 5-4-10b

5.4.11 PCB Clot Detection Module BP7 Part 1 of 5 Printed Circuit Diagram

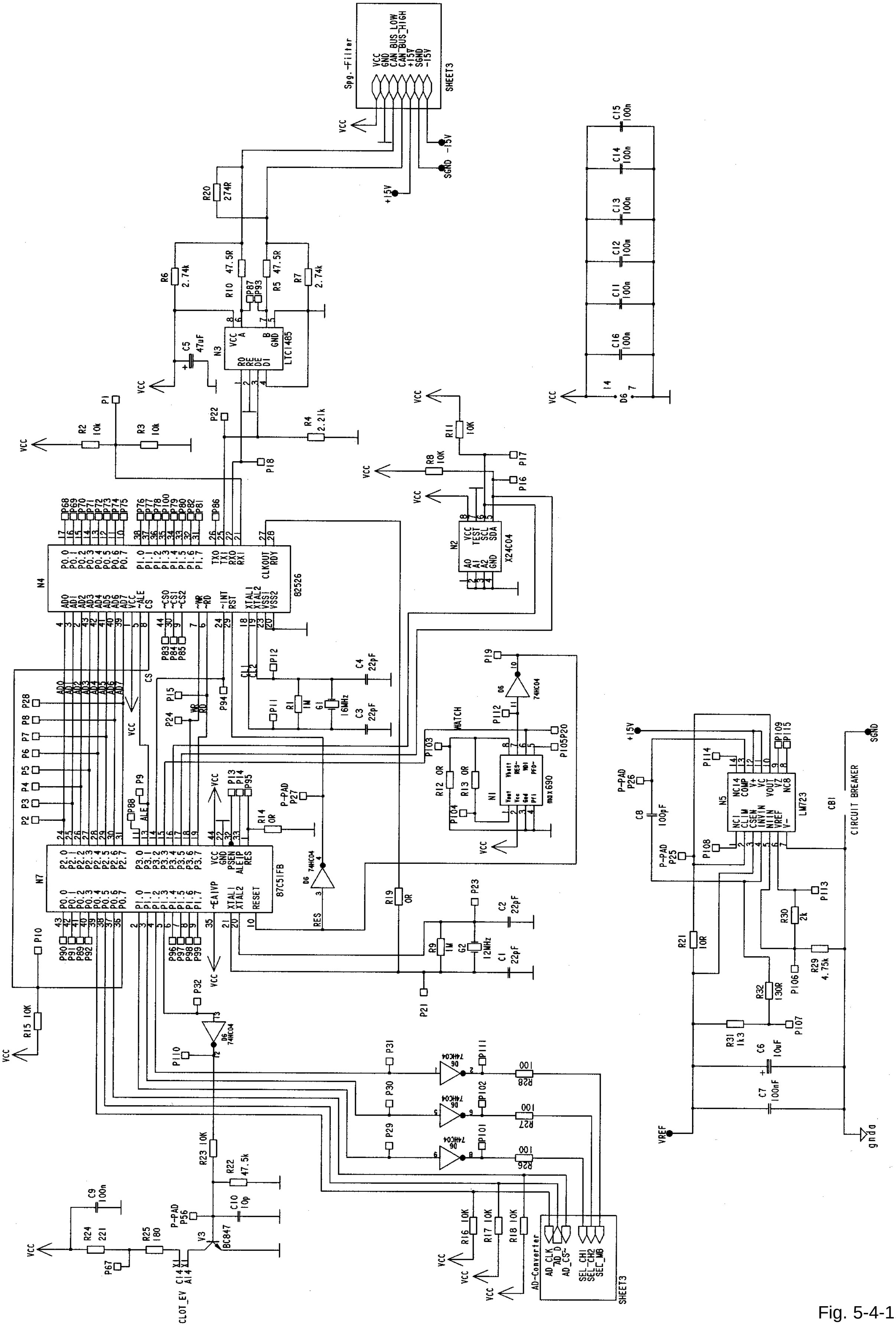

Spg.-Filter
VCC
GND
CAN_BUS_LOW
CAN_BUS_HIGH
+15V
SGND
-15V
SHEET3
N3 LTC1485
N4 82526
N7 87C51FB
N2 X24C04
N1 max690
N5 LM723
CB1 CIRCUIT BREAKER
D6 74HC04
V3 BC847
G1 16MHz
G2 12MHz
R20 274R
R10 47.5R
R5 47.5R
R6 2.74k
R7 2.74k
R4 2.21k
R2 10k
R3 10k
R11 10K
R8 10K
R1 1M
R9 1M
C3 22pF
C4 22pF
C1 22pF
C2 22pF
C5 47uF
C8 100pF
C6 10uF
C7 100nF
C9 100n
C10 10p
C11 100n
C12 100n
C13 100n
C14 100n
C15 100n
C16 100n
R12 0R
R13 0R
R14 0R
R19 0R
R15 10K
R16 10K
R17 10K
R18 10K
R21 10R
R22 47.5k
R23 10K
R24 221
R25 180
R26 100
R27 100
R28 100
R29 4.75k
R30 2k
R31 1k3
R32 130R
WATCH
VREF
gnda
AD-Converter
AD_CLK
AD_D
AD_CS
SEL_CH1
SEL_CH2
SEL_MB
CLOT_EV
P-PAD

Fig. 5-4-11s

5.4.11 PCB Clot Detection Module BP7 Part 2 of 5
Printed Circuit Diagram

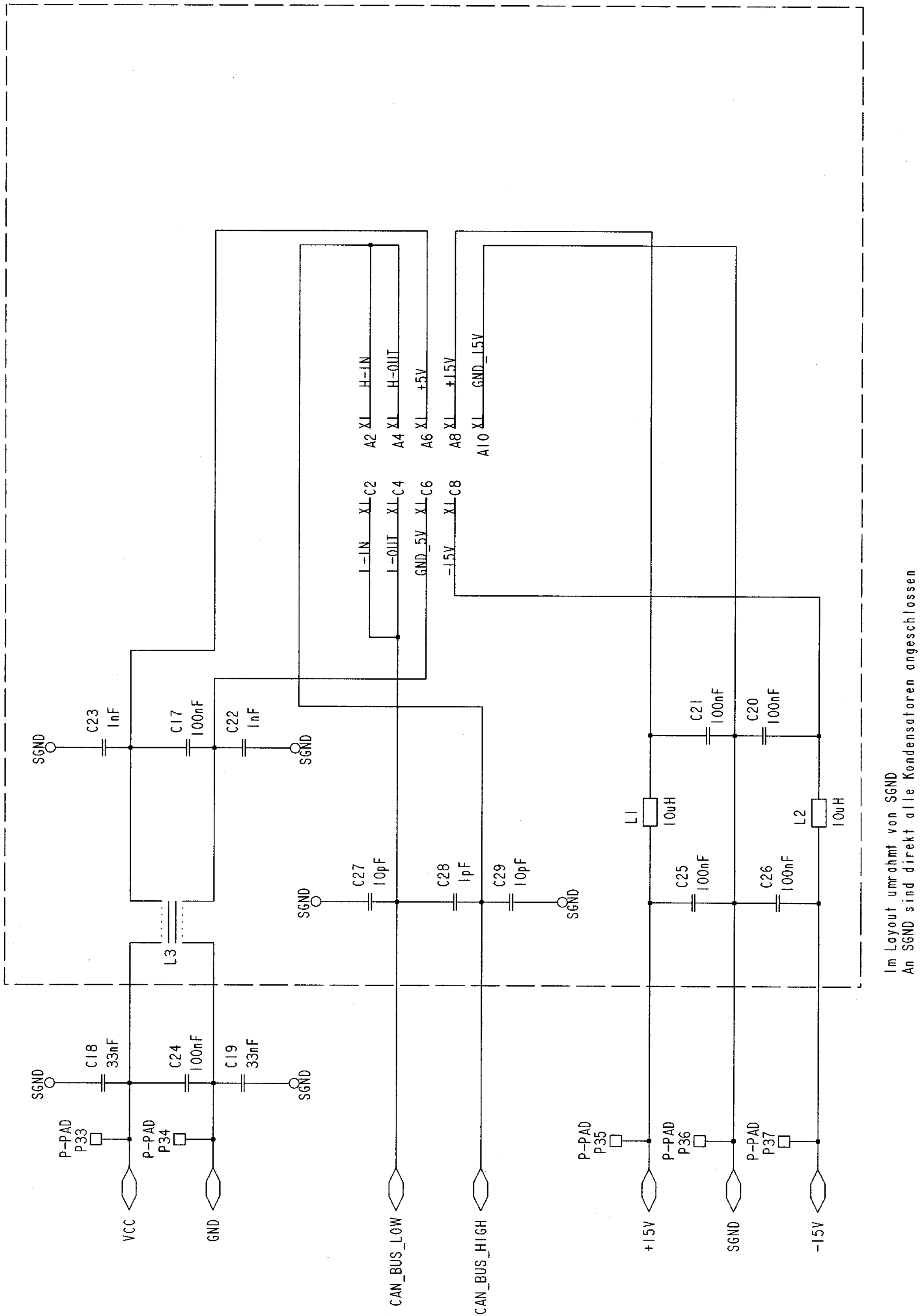

A2 XL H-IN
A4 XL H-OUT
A6 XL +5V
A8 XL +15V
A10 XL GND_15V
I-IN XL C2
I-OUT XL C4
GND_5V XL C6
-15V XL C8
SGND
C23 1nF
C17 100nF
C22 1nF
L3
C27 10pF
C28 1pF
C29 10pF
C21 100nF
C20 100nF
L1 10uH
L2 10uH
C25 100nF
C26 100nF
C18 33nF
C24 100nF
C19 33nF
P-PAD P33
P-PAD P34
P-PAD P35
P-PAD P36
P-PAD P37
VCC
GND
CAN_BUS_LOW
CAN_BUS_HIGH
+15V
SGND
-15V
Im Layout umrahmt von SGND
An SGND sind direkt alle Kondensatoren angeschlossen

Fig. 5-4-112s

5.4.11 PCB Clot Detection Module BP7 Part 3 of 5 Printed Circuit Diagram

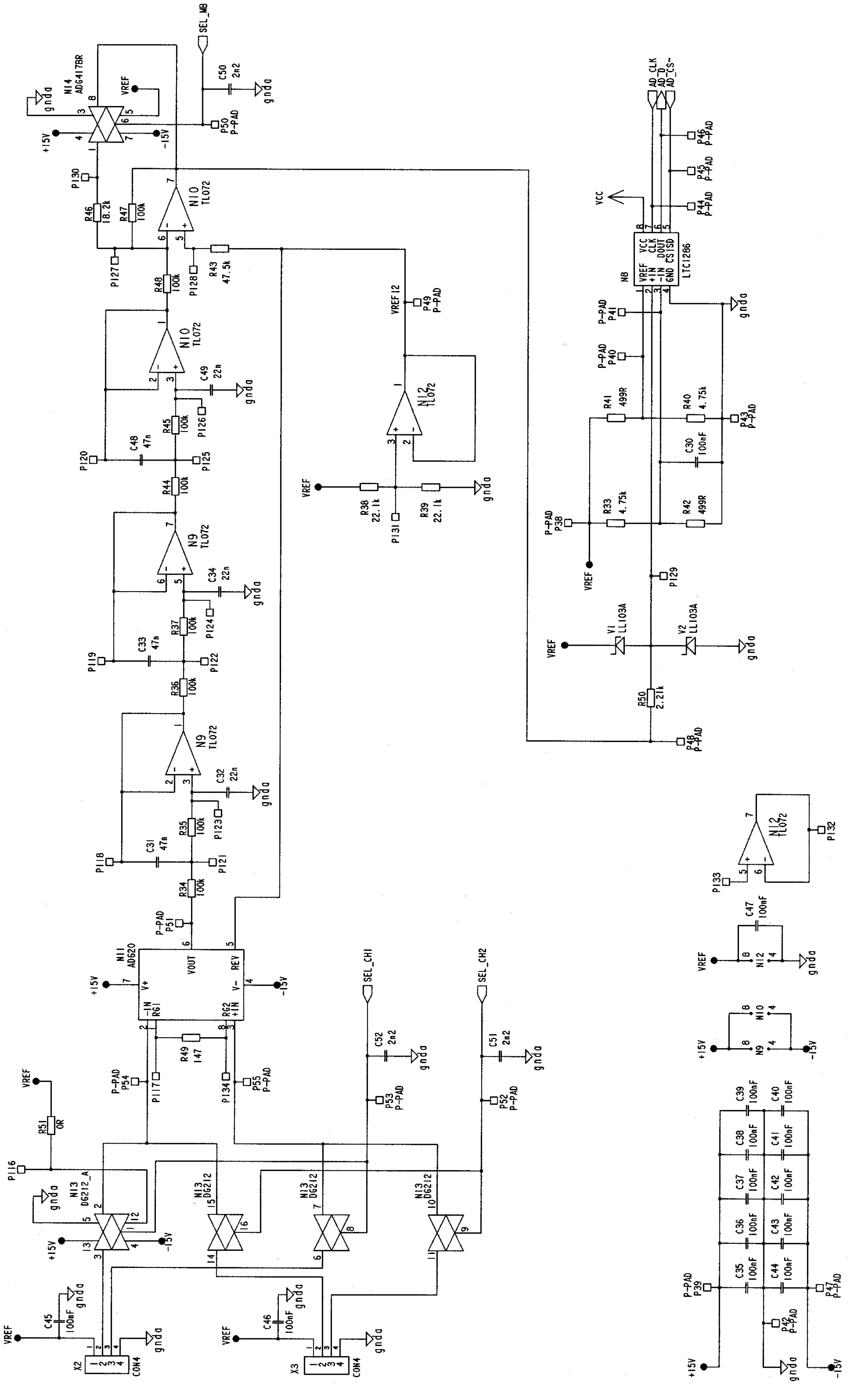

SEL_MB
N14
AD6417BR
VREF
C50
2n2
P50
P-PAD
gnda
+15V
-15V
P130
R46
18.2k
R47
100k
N10
TL072
P127
R48
100k
P128
R43
47.5k
C49
22n
R45
100k
P126
C48
47n
P120
P125
R44
100k
N9
TL072
C34
22n
R37
100k
P124
C33
47n
P119
P122
R36
100k
C32
22n
R35
100k
P123
C31
47n
P118
P121
R34
100k
P51
N11
AD620
VOUT
REF
V+
V-
-IN
RG1
RG2
+IN
R49
147
P54
P117
P134
P55
R51
0R
P116
N13
DG212_A
DG212
SEL_CH1
SEL_CH2
C52
2n2
C51
2n2
P53
P52
C45
100nF
C46
100nF
X2
X3
CON4
VREF12
P49
N12
TL072
R38
22.1k
R39
22.1k
P131
AD_CLK
AD_D
AD_CS~
P46
P45
P44
VCC
N8
LTC1286
CLK
DOUT
CS1SD
+IN
-IN
GND
P41
P40
R41
499R
R40
4.75k
P43
C30
100nF
P38
R33
4.75k
R42
499R
P129
V1
LL103A
V2
LL103A
R50
2.21k
P48
P132
P133
C47
100nF
C39
C40
C38
C41
C37
C42
C36
C43
C35
C44
100nF
P39
P47
P42

Fig. 5-4-113s

5.4.11 PCB Clot Detection Module BP7 Part 4 of 5 Printed Circuit Diagram

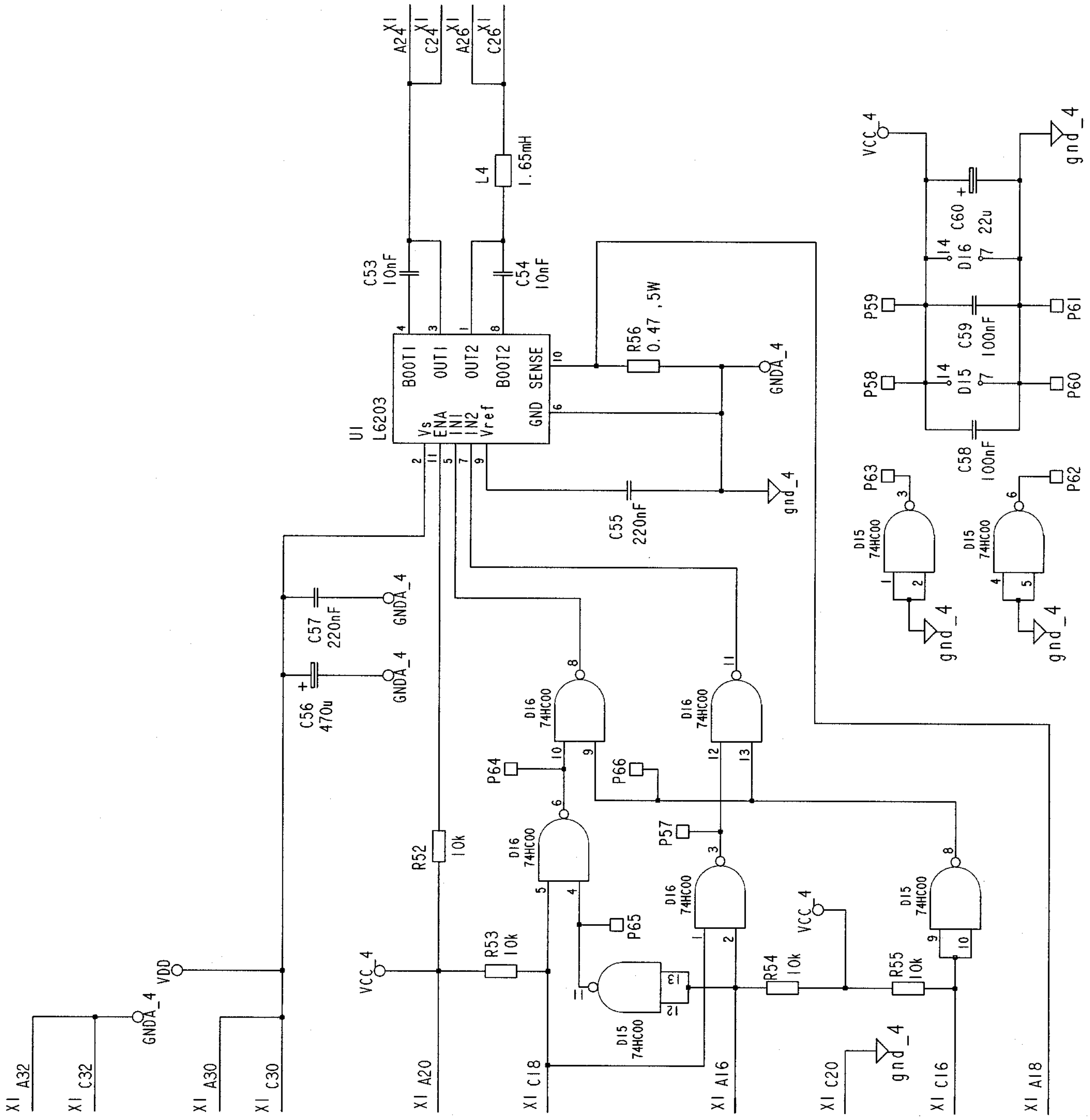

X1 A24
X1 C24
X1 A26
X1 C26
L4
1.65mH
C53
10nF
C54
10nF
U1
L6203
BOOT1
OUT1
OUT2
BOOT2
SENSE
GND
Vs
ENA
IN1
IN2
Vref
R56
0.47 ,5W
GNDA_4
gnd_4
C55
220nF
C57
220nF
C56
470u
R52
10k
R53
10k
R54
10k
R55
10k
D16
74HC00
D15
74HC00
P57
P58
P59
P60
P61
P62
P63
P64
P65
P66
VCC_4
C60
22u
C59
100nF
C58
100nF
VDD
X1 A32
X1 C32
X1 A30
X1 C30
X1 A20
X1 C18
X1 A16
X1 C20
X1 C16
X1 A18

Fig. 5-4-114s

5.4.11 PCB Clot Detection Module BP7 Part 5 of 5 Layout Diagram

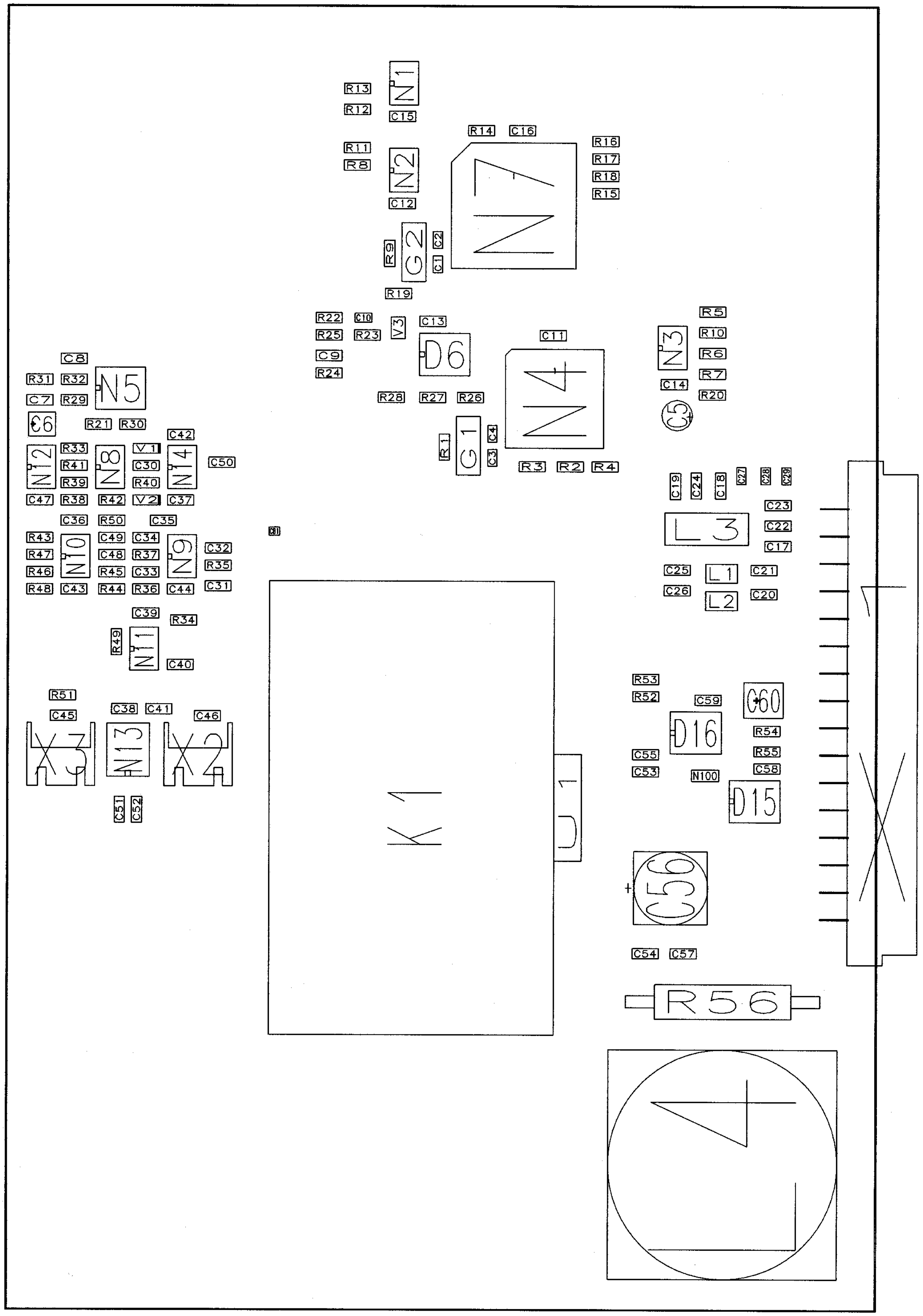

R13
R12
N1
C15
R14
C16
R16
R17
R18
R15
R11
R8
N2
C12
N7
R9
G2
C2
C1
R19
R22
C10
R25
R23
V3
C13
C9
R24
D6
C11
R5
R10
R6
R7
R20
N3
C14
C5
N4
C8
R31
R32
N5
C7
R29
C6
R21
R30
R28
R27
R26
R1
G1
C4
C3
R3
R2
R4
C42
R33
V1
R41
C30
N12
N8
N14
C50
R39
R40
C47
R38
R42
V2
C37
C19
C24
C18
C27
C28
C29
C36
R50
C35
C23
L3
C22
R43
C49
C34
C32
C17
R47
N10
C48
R37
N9
R35
R46
R45
C33
C25
L1
C21
R48
C43
R44
R36
C44
C31
C26
L2
C20
C39
R34
R49
N11
C40
K1
R53
R52
C59
C60
R51
C45
C38
C41
C46
D16
R54
X3
N13
X2
U1
C55
R55
C53
N100
C58
D15
C51
C52
C56
+
C54
C57
R56
L4

Fig. 5-4-11b

5.4.12 PCB Potentiostat/Motor Part 1 of 3 Printed Circuit Diagram

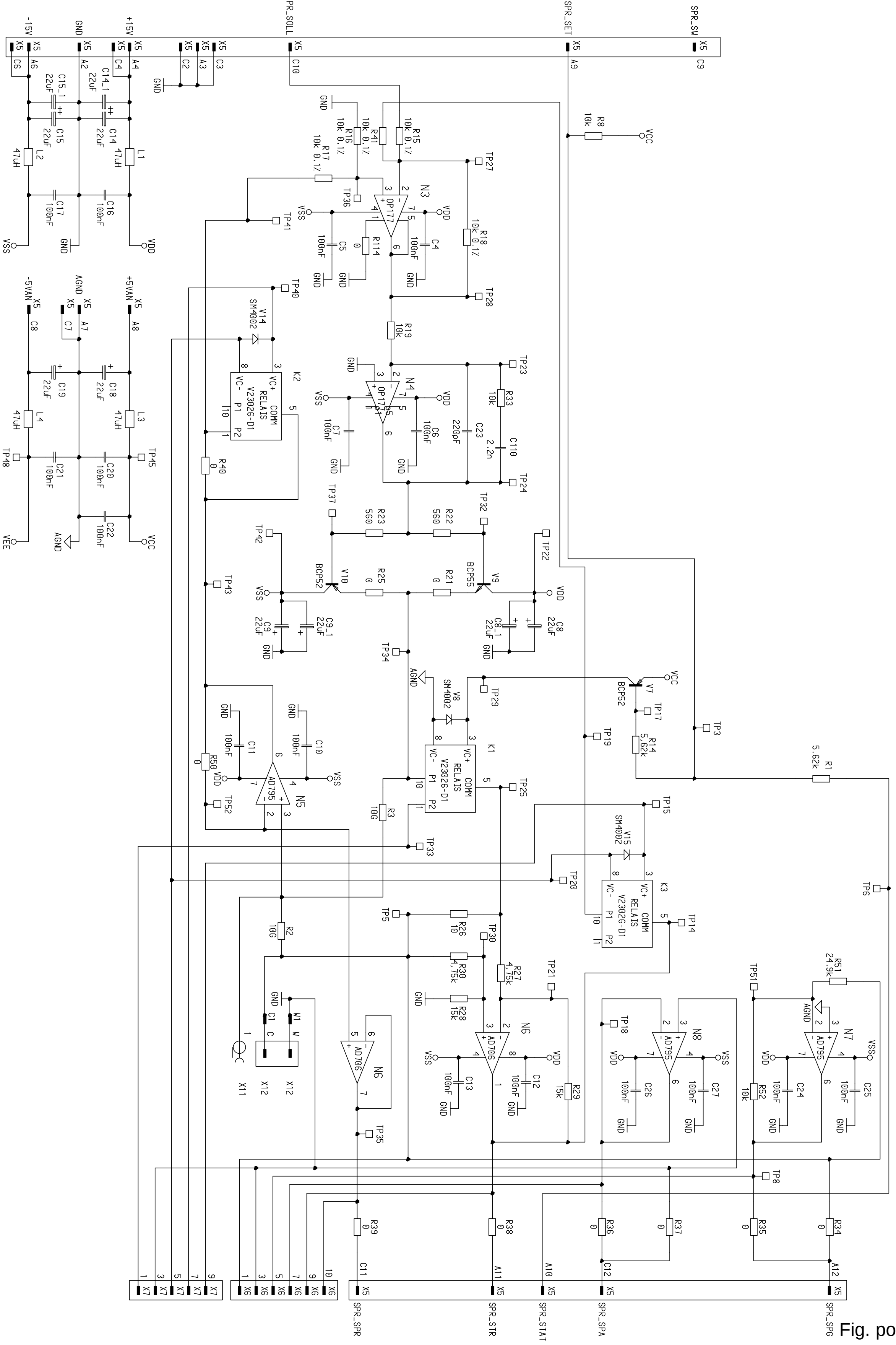

-15V
GND
+15V
SPR_SOLL
SPR_SET
SPR_SW
X5 C6
X5 A6
X5 A2
X5 C4
X5 A4
X5 C2
X5 A3
X5 C3
X5 C10
X5 A9
X5 C9
C15_1 22uF
C14_1 22uF
C15 22uF
C14 22uF
L2 47uH
L1 47uH
C17 100nF
C16 100nF
VSS
VDD
VCC
R8 10k
R15 10k 0.1%
R41 10k 0.1%
R16 10k 0.1%
R17 10k 0.1%
R18 10k 0.1%
N3 OP177
TP27
TP36
TP41
TP40
TP28
C5 100nF
C4 100nF
R114 0
-5VAN
AGND
+5VAN
X5 C8
X5 C7
X5 A7
X5 A8
C19 22uF
C18 22uF
L4 47uH
L3 47uH
TP48
TP45
C21 100nF
C20 100nF
C22 100nF
VEE
V14 SM4002
K2 RELAIS V23026-D1
VC+ COMM VC- P1 P2
R40 0
R19 10k
N4 OP177
TP23
R33 10k
C7 100nF
C6 100nF
C23 220pF
C110 2.2n
TP24
TP37
TP32
R23 560
R22 560
TP42
TP22
V10 BCP52
V9 BCP55
R25 0
R21 0
TP43
C9 22uF
C9_1 22uF
C8_1 22uF
C8 22uF
TP34
V8 SM4002
TP29
V7 BCP52
TP17
R14 5.62k
TP19
TP3
R1 5.62k
K1 RELAIS V23026-D1
TP25
C11 100nF
C10 100nF
R50 0
N5 AD795
TP52
R3 10G
TP33
V15 SM4002
TP15
K3 RELAIS V23026-D1
TP20
TP6
TP5
R26 10
TP14
R2 10G
TP30
R30 4.75k
R27 4.75k
TP21
R28 15k
TP51
R51 24.9k
GND C1 W1
C W
X11 X12 X12
N6 AD706
C13 100nF
C12 100nF
R29 15k
TP18
N8 AD795
C26 100nF
C27 100nF
N7 AD795
R52 10k
C24 100nF
C25 100nF
TP35
TP8
R39 0
R38 0
R36 0
R37 0
R35 0
R34 0
X7 1 3 5 7 9
X6 1 3 5 7 9 10
X5 C11
X5 A11
X5 A10
X5 C12
X5 A12
SPR_SPR
SPR_STR
SPR_STAT
SPR_SPA
SPR_SPG

Fig. potstr

5.4.12 PCB Potentiostat/Motor Part 2 of 3 Layout Diagram

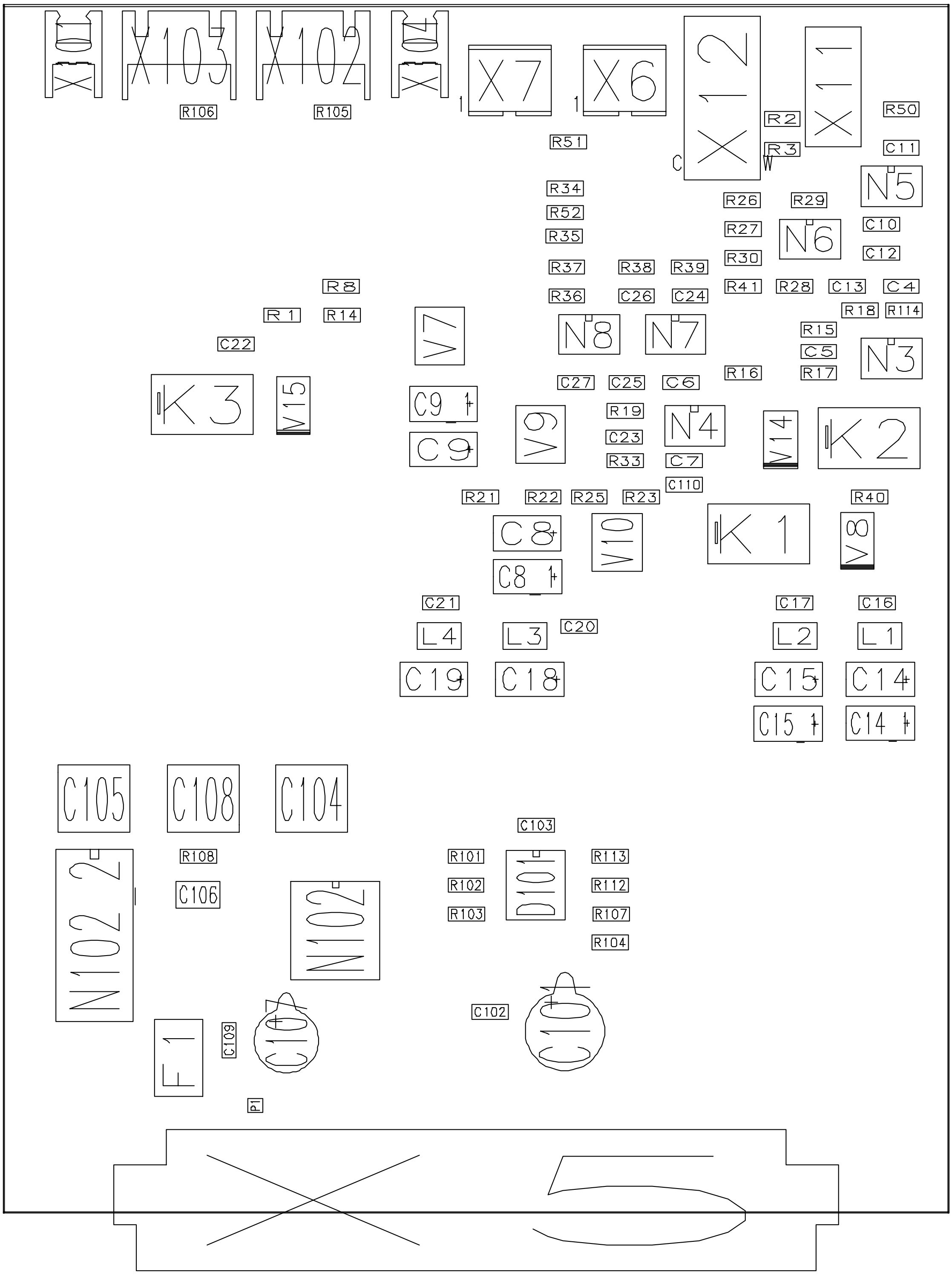

X10
X103
X102
X4
1
X7
1
X6
X12
C
X11
R106
R105
R51
R2
R3
W
R50
C11
N5
R34
R52
R35
R26
R29
R27
R30
N6
C10
C12
R37
R38
R39
R8
R1
R14
R36
C26
C24
R41
R28
C13
C4
R18
R114
R15
C5
R17
N3
C22
V7
N8
N7
K3
V15
C27
C25
C6
R16
C9_1
C9
V9
R19
C23
R33
N4
C7
C110
V14
K2
R21
R22
R25
R23
R40
C8
C8_1
V10
K1
V8
C21
C17
C16
L4
L3
C20
L2
L1
C19
C18
C15
C14
C15_1
C14_1
C105
C108
C104
C103
R108
R101
R102
R103
D101
R113
R112
R107
R104
N102_2
C106
N102
C102
F1
C109
C10
C10
P1
X5

Fig. potbest

5.4.12 PCB Potentiostat/Motor Part 3 of 3
Cell Driver Block Diagram

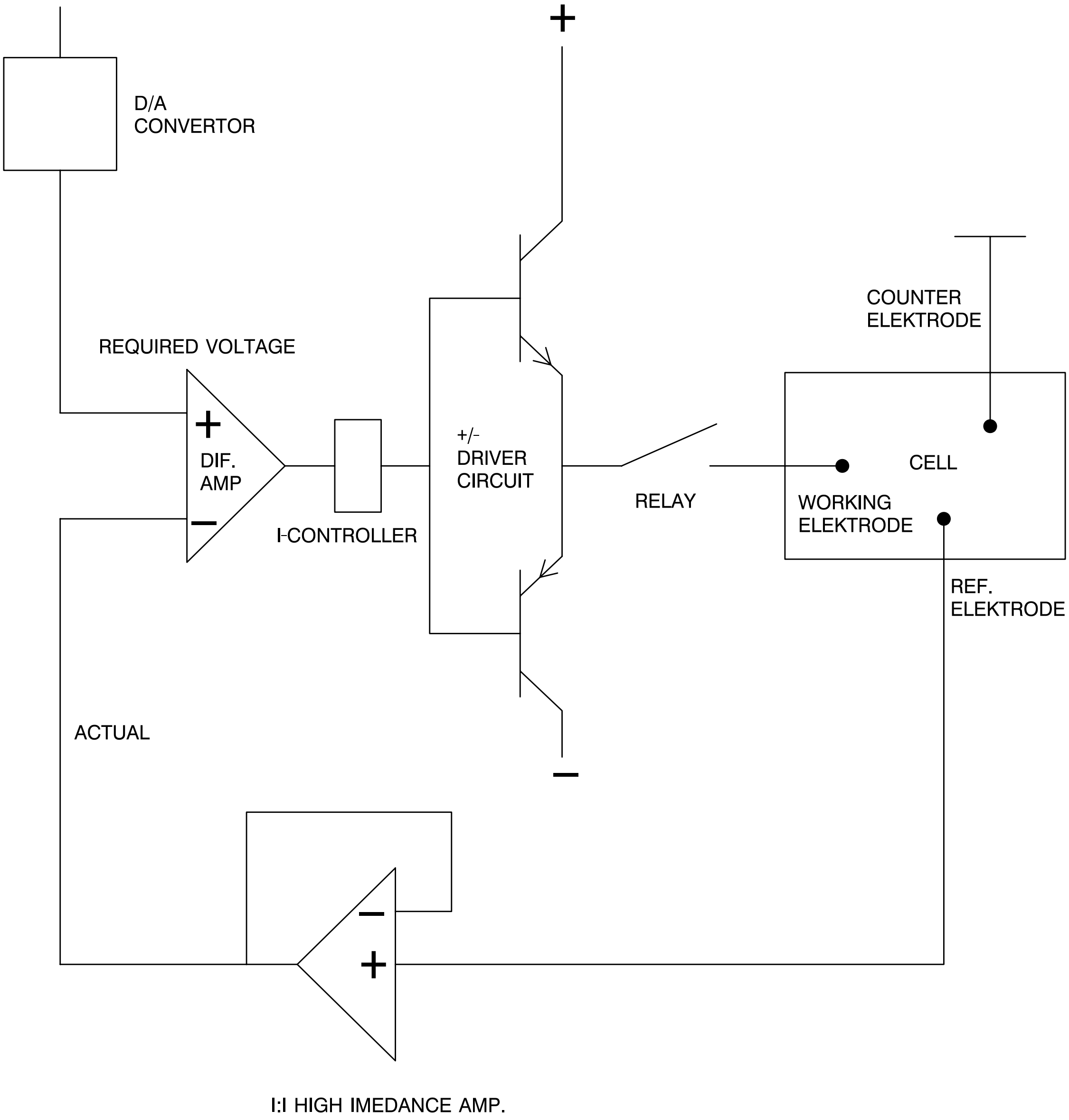

+
D/A
CONVERTOR
COUNTER
ELEKTRODE
REQUIRED VOLTAGE
+
DIF.
AMP
−
I-CONTROLLER
+/-
DRIVER
CIRCUIT
RELAY
CELL
WORKING
ELEKTRODE
REF.
ELEKTRODE
ACTUAL
−
−
+
I:I HIGH IMEDANCE AMP.

Fig. cell-d

5.4.13 PCB Preamp Temperature Part 1 of 2 Printed Circuit Diagram

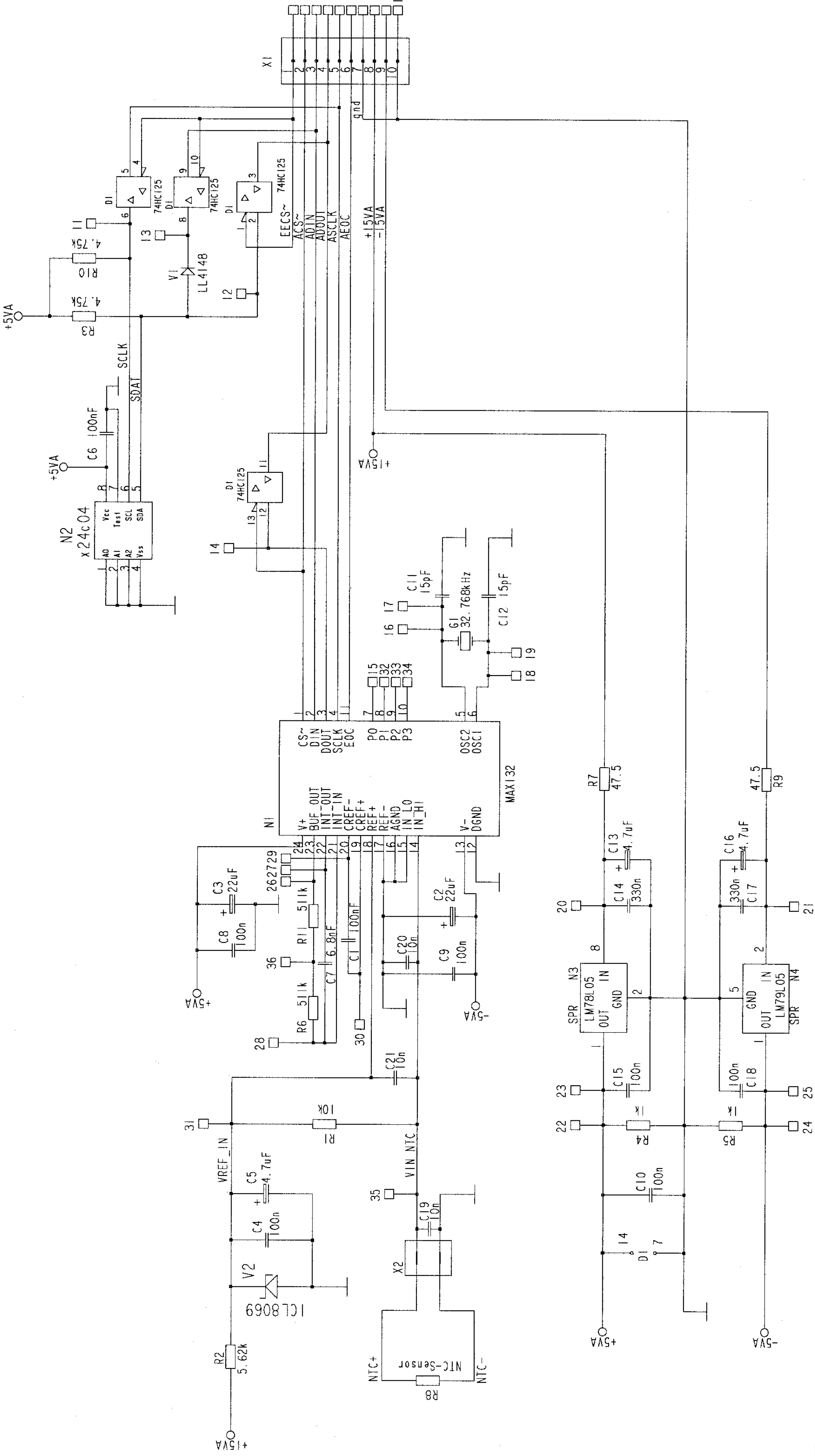

X1
1 2 3 4 5 6 7 8 9 10
gnd
D1 74HC125
EECS~
ACS~
ADIN
ADOUT
ASCLK
AEOC
+15VA
-15VA
I1
I2
I3
I4
V1 LL4148
R10 4.75k
R3 4.75k
+5VA
SCLK
SDAT
C6 100nF
N2 x24c04
Vcc Test SCL SDA
A0 A1 A2 Vss
+15VA
C11 15pF
C12 15pF
G1 32.768kHz
I5 I6 I7 I8 I9
32 33 34
N1 MAX132
CS~ DIN DOUT SCLK EOC
P0 P1 P2 P3
OSC2 OSC1
V+ BUF_OUT INT_OUT INT_IN CREF- CREF+ REF+ REF- AGND IN_LO IN_HI
V- DGND
26 27 29
C3 22uF
C8 100n
R11 511k
R6 511k
C7 6.8nF
C1 100nF
C2 22uF
C20 10n
C9 100n
+5VA
-5VA
28 30 31 35 36
C21 10n
R1 10K
VREF_IN
VIN NTC
C5 4.7uF
C4 100n
V2 ICL8069
R2 5.62k
+15VA
C19 10n
X2
NTC+ NTC- NTC-Sensor
R8
R7 47.5
R9 47.5
C13 4.7uF
C14 330n
C16 4.7uF
C17 330n
N3 LM78L05
N4 LM79L05
IN GND OUT SPR
C15 100n
C18 100n
R4 1k
R5 1k
C10 100n
D1
20 21 22 23 24 25
+5VA
-5VA

Fig. 5-4-13s

5.4.13 PCB Preamp Temperature Part 2 of 2 Layout Diagram

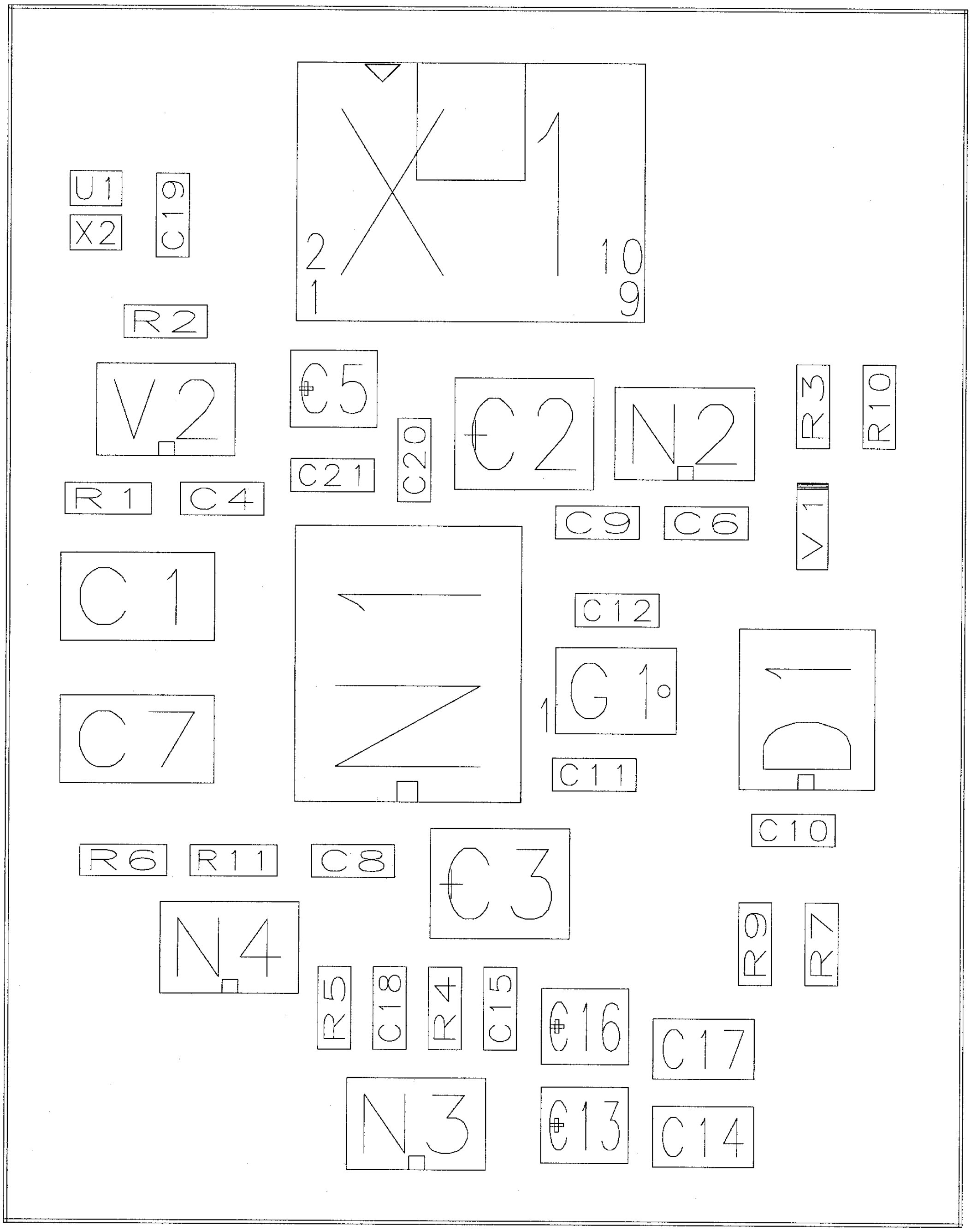

X1
2
1
10
9
U1
X2
C19
R2
V2
C5
C20
C2
N2
R3
R10
C21
R1
C4
C9
C6
V1
C1
N1
C12
G1
1
D1
C7
C11
C10
R6
R11
C8
C3
N4
R9
R7
R5
C18
R4
C15
C16
C17
N3
C13
C14

Fig. 5-4-13b

5.4.14 PCB Waste Level Part 1 of 2
Printed Circuit Diagram

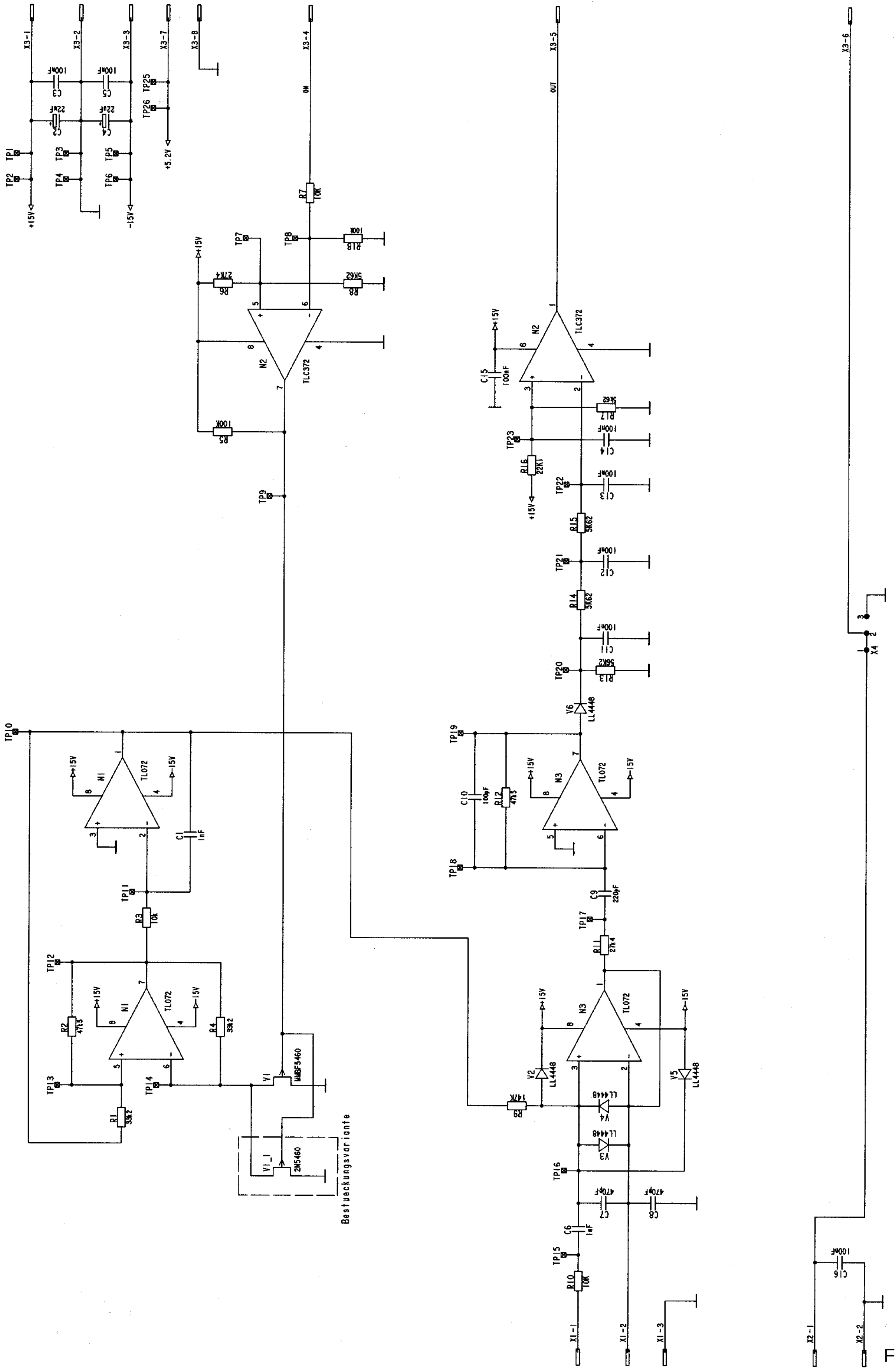

X3-1
X3-2
X3-3
X3-7
X3-8
X3-4
X3-5
X3-6
IN
OUT
C3 100nF
C5 100nF
C2 22uF
C4 22uF
TP25
TP26
+5.2V
+15V
-15V
R7 10K
R18 100K
R6 27K4
R8 5K62
R5 100K
N2 TLC372
N1 TL072
N3 TL072
C15 100nF
R17 5K62
C14 100nF
R16 22K1
C13 100nF
R15 5K62
C12 100nF
R14 5K62
C11 100nF
R13 56K2
V6 LL4448
C10 100pF
R12 47K5
C1 1nF
R3 10k
R2 47K5
R4 33K2
R1 33K2
V1 MMBF5460
V1_1 2N5460
Bestueckungsvariante
C9 220pF
R11 27K4
V2 LL4448
V5 LL4448
V4 LL4448
V3 LL4448
R9 147K
C7 470pF
C8 470pF
C6 1nF
R10 10K
C16 100nF
X4
X1-1
X1-2
X1-3
X2-1
X2-2

Fig. 5-4-14s

5.4.14 PCB Waste Level Part 2 of 2 Layout Diagram

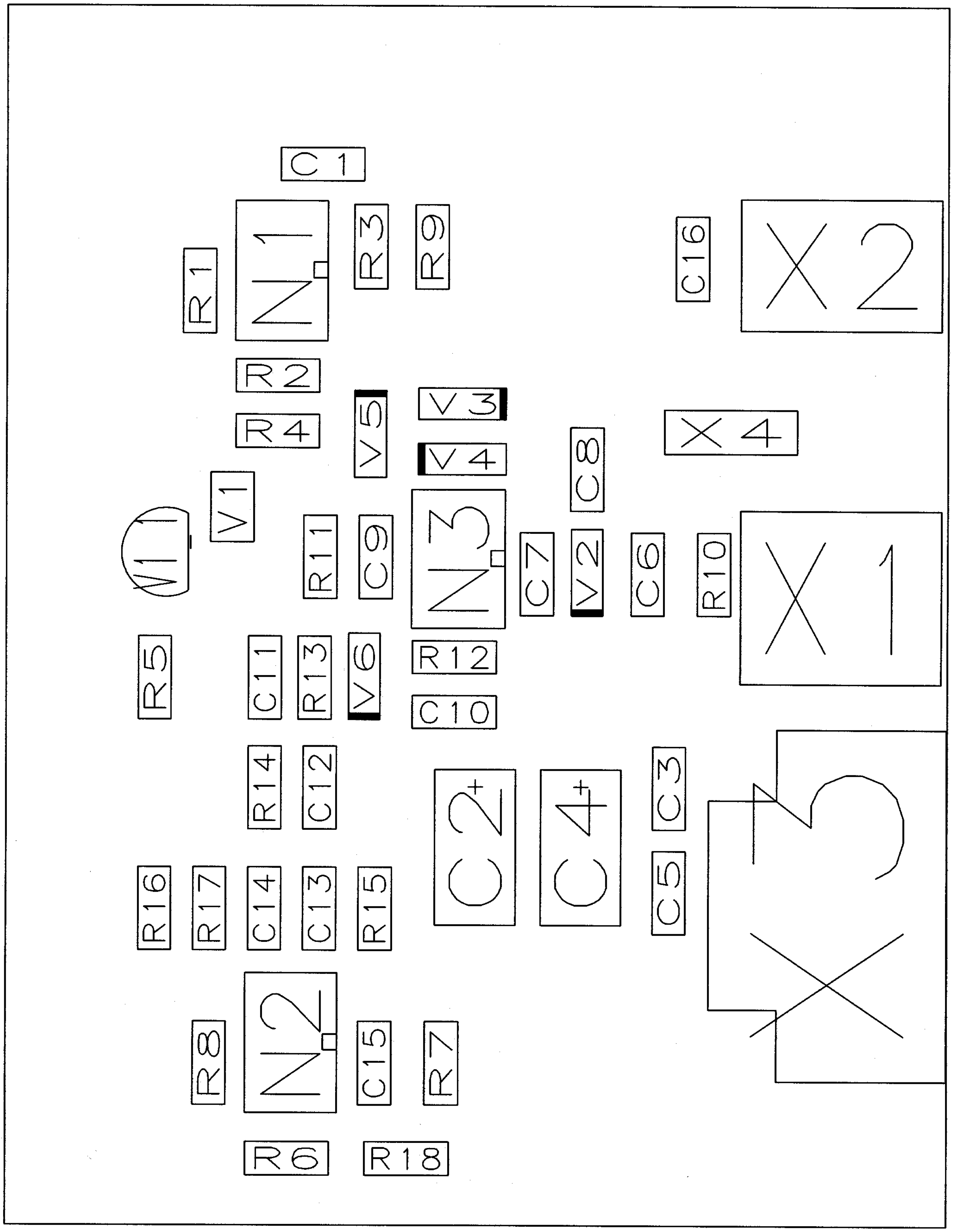

C1
N1
R3
R9
C16
X2
R1
R2
R4
V5
V3
V4
X4
C8
V1
V11
R11
C9
N3
C7
V2
C6
R10
X1
R5
C11
R13
V6
R12
C10
R14
C12
C2
C4
C3
X3
R16
R17
C14
C13
R15
C5
N2
R8
C15
R7
R6
R18

Fig. 5-4-14b

5.4.15 PCB Preamp High Voltage Part 1 of 2 Printed Circuit Diagram

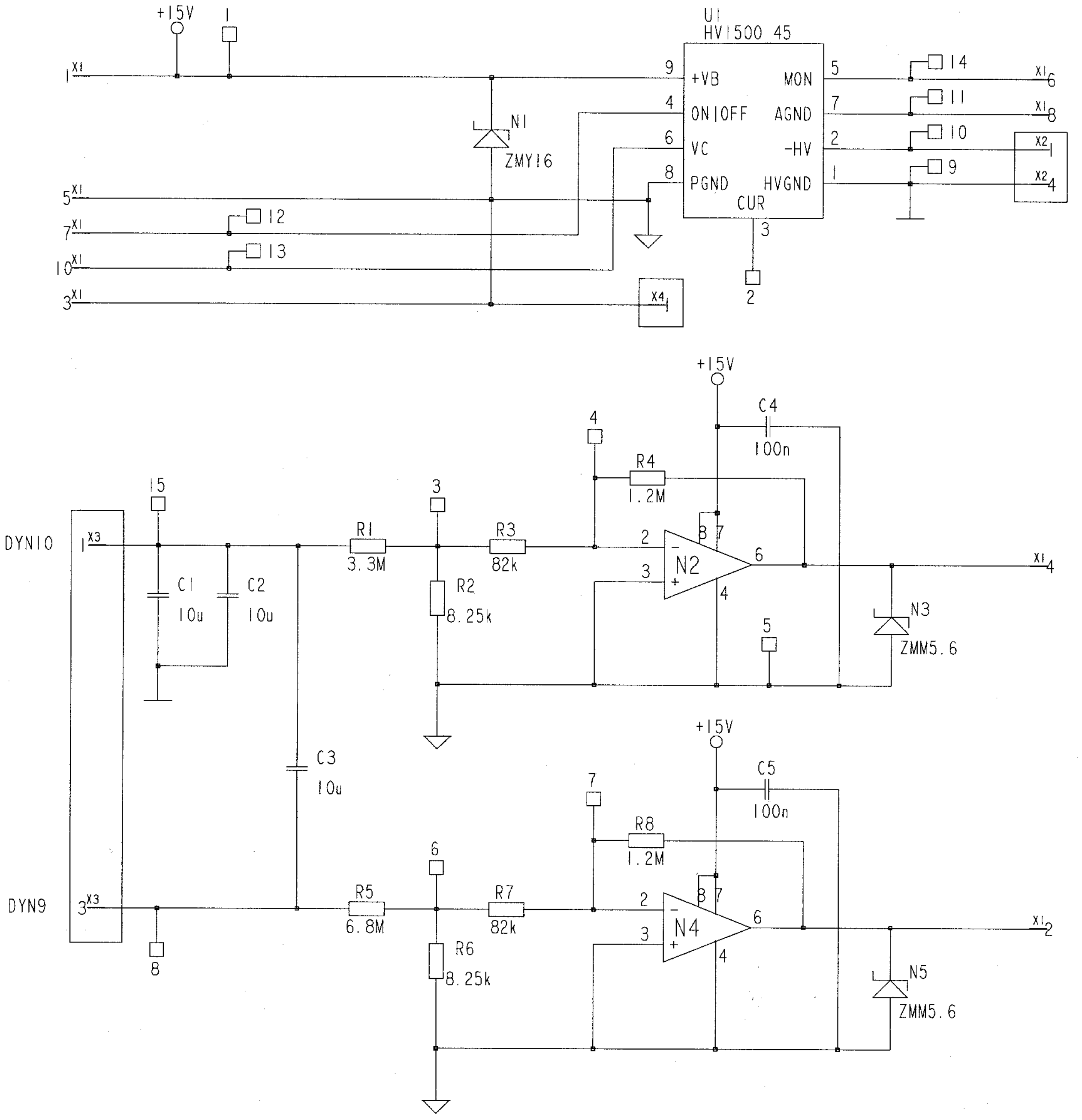

+15V
U1
HV1500 45
+VB
ON|OFF
VC
PGND
MON
AGND
-HV
HVGND
CUR
N1
ZMY16
X1
X2
X4
12
13
14
11
10
9
DYN10
DYN9
X3
15
R1
3.3M
C1
10u
C2
10u
C3
10u
R2
8.25k
R3
82k
R4
1.2M
C4
100n
N2
N3
ZMM5.6
R5
6.8M
R6
8.25k
R7
82k
R8
1.2M
C5
100n
N4
N5
ZMM5.6

Fig. 5-4-15s

5.4.15 PCB Preamp High Voltage Part 2 of 2 Layout Diagram

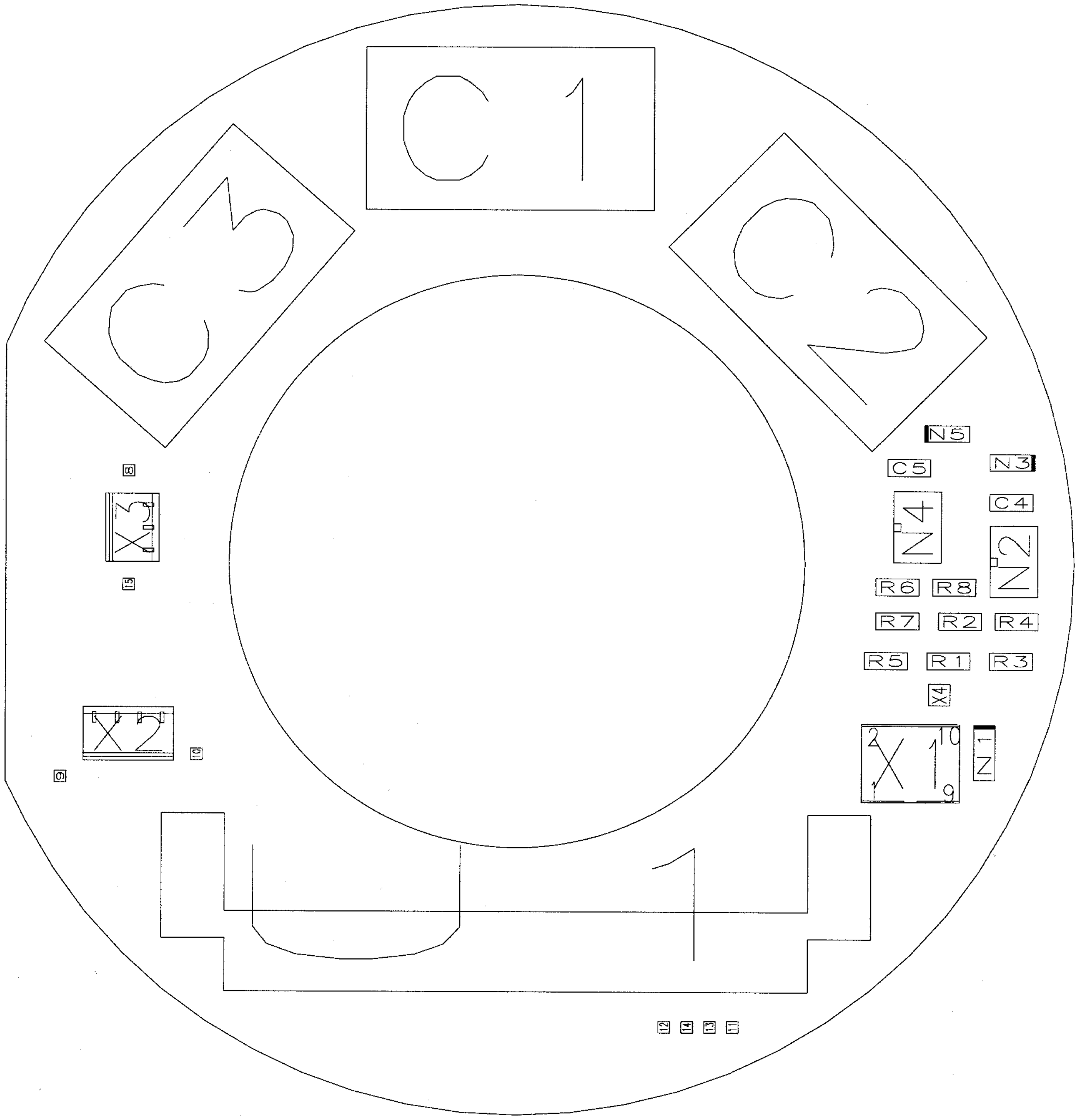

C1
C2
C3
N5
C5
N3
N4
C4
N2
R6
R8
R7
R2
R4
R5
R1
R3
X4
X1
2
10
1
9
N1
X3
8
15
X2
9
10
U1
12
14
13
11

Fig. 5-4-15b

5.4.16 PCB Detection Preamplifier Part 1 of 2 Printed Circuit Diagram

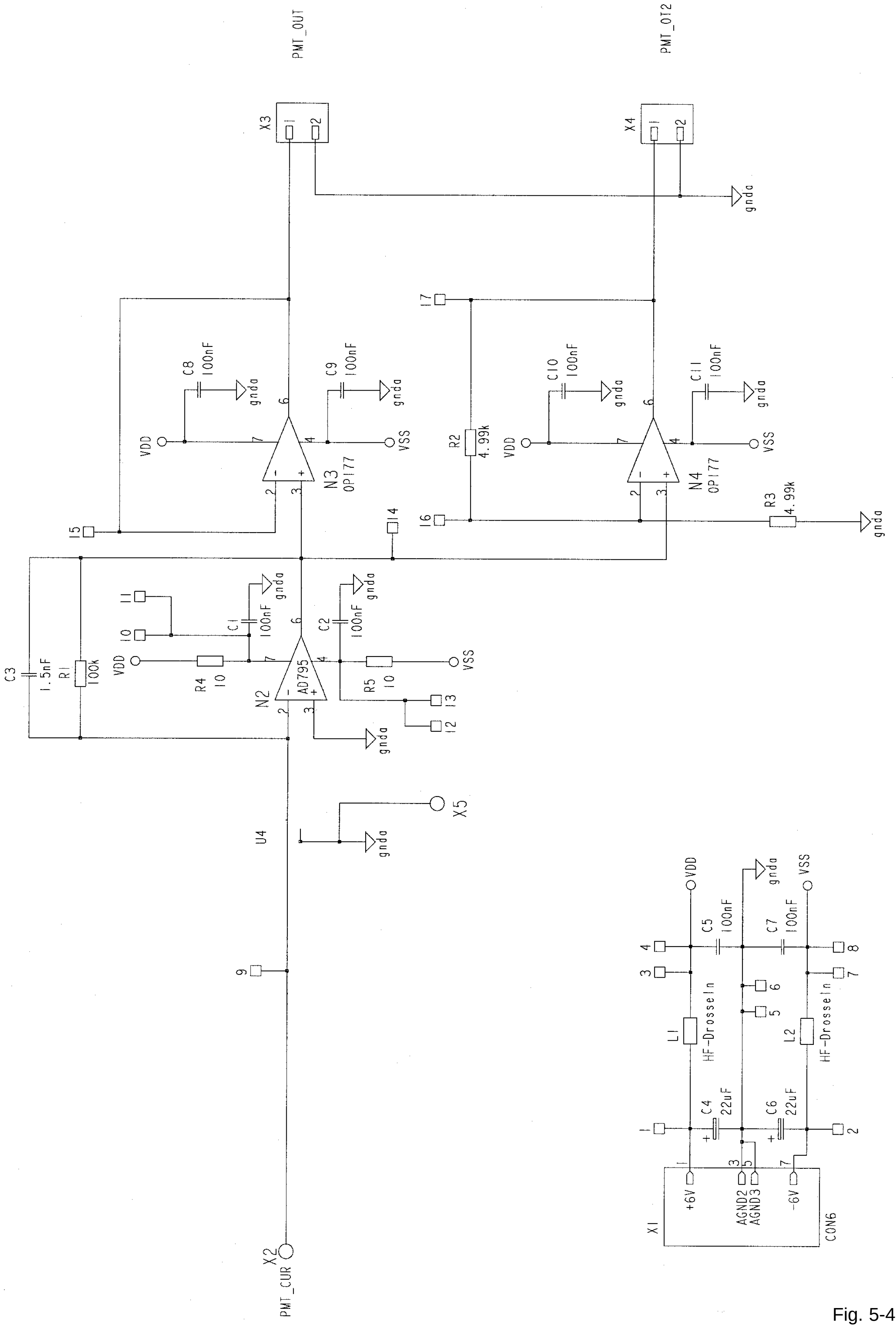

PMT_OUT
PMT_OT2
X3
X4
1
2
gnda
I7
C8
100nF
C9
100nF
C10
100nF
C11
100nF
VDD
VSS
6
7
4
2
3
N3
OP177
N4
OP177
R2
4.99k
R3
4.99k
I5
I4
I6
I1
I0
C1
100nF
C2
100nF
C3
1.5nF
R1
100k
R4
10
R5
10
N2
AD795
I3
I2
X5
U4
9
X2
PMT_CUR
C5
100nF
C7
100nF
L1
HF-Drosseln
L2
HF-Drosseln
C4
22uF
C6
22uF
X1
+6V
AGND2
AGND3
-6V
CON6

Fig. 5-4-16s

5.4.16 PCB Detection Preamplifier Part 2 of 2 Layout Diagram

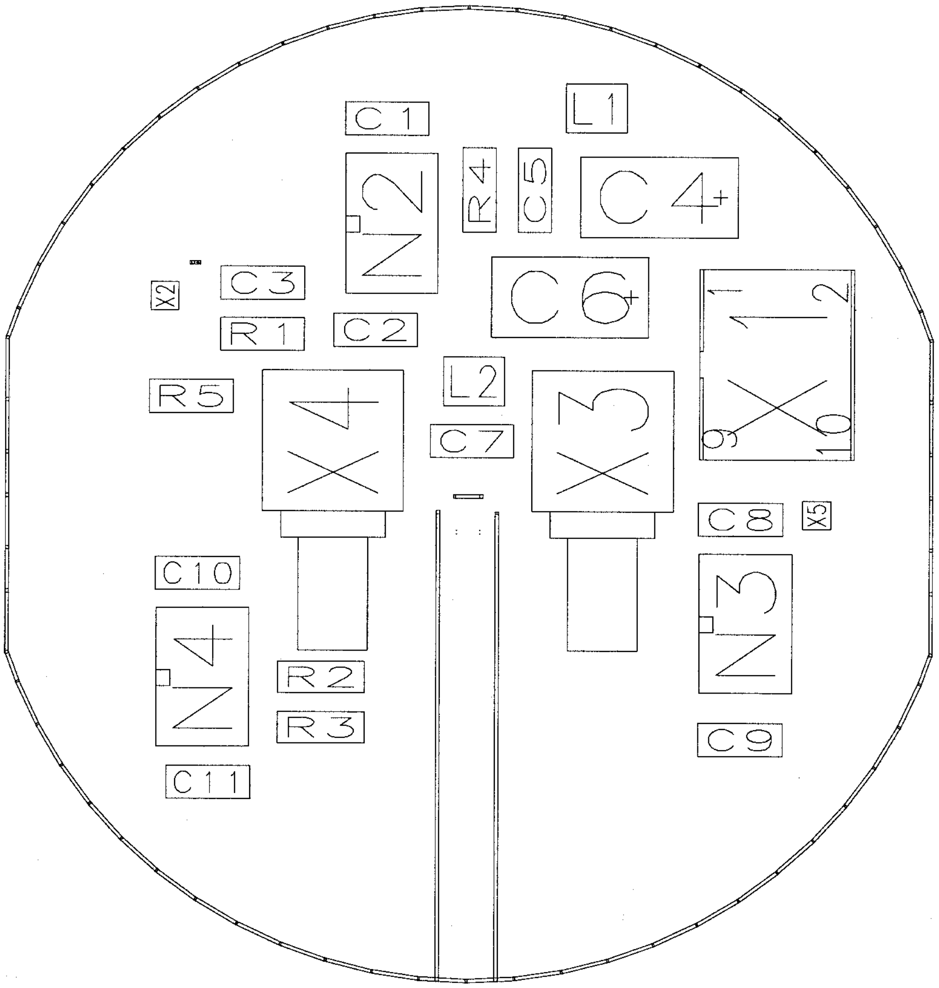

C1
L1
N2
R4
C5
C4+
X2
C3
C6+
X1
1
2
9
10
R1
C2
R5
X4
L2
C7
X3
C8
X5
C10
N3
N4
R2
R3
C9
C11

Fig. 5-4-16b

5.4.17 PCB Preamp LLD S/R Part 1 of 2
Printed Circuit Diagram

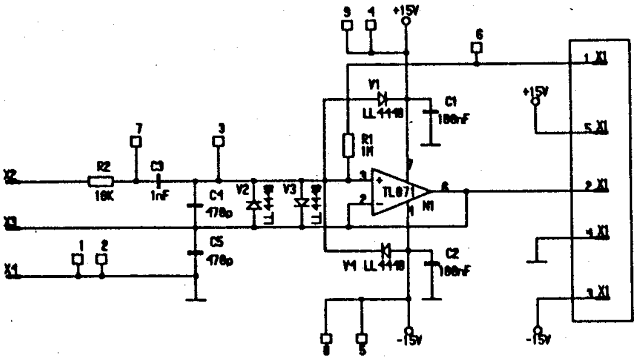

9
4
+15V
6
1 X1
V1
LL4148
C1
100nF
+15V
5 X1
7
3
R1
1M
R2
10K
C3
1nF
X2
C4
470p
V2
V3
TL071
N1
2 X1
X3
C5
470p
1
2
X1
V4 LL4148
C2
100nF
4 X1
3 X1
8
5
-15V
-15V

Fig. 5-4-17s

5.4.17 PCB Preamp LLD S/R Part 2 of 2
Layout Diagram

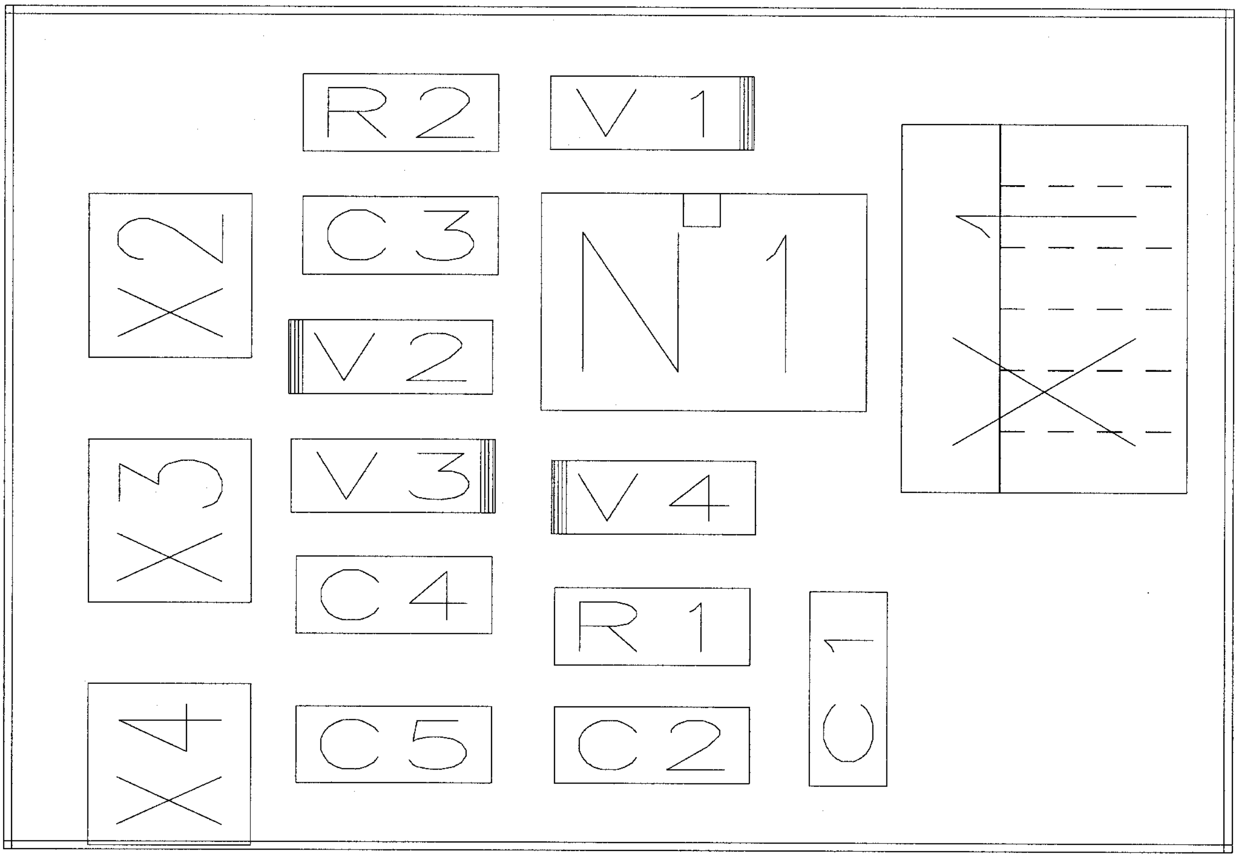

R2
V1
X2
C3
N1
V2
X3
V3
V4
C4
R1
X4
C5
C2
C1

Fig. 5-4-17b

5.4.18 PCB Preamp LLD Sipper Part 1 of 2
Printed Circuit Diagram

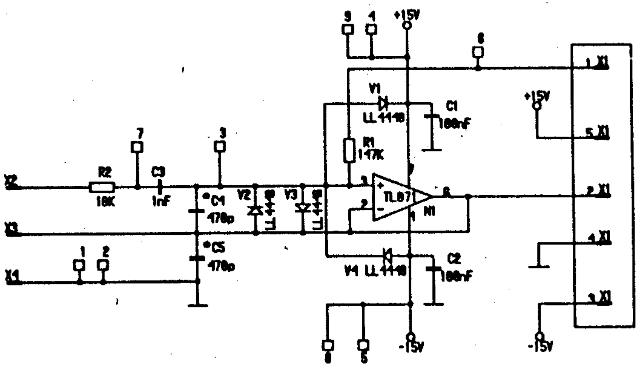

9
4
+15V
8
1 X1
V1
LL4148
C1
100nF
+15V
5 X1
R1
147K
7
3
R2
10K
C3
1nF
X2
C4
470p
V2
V3
TL071
N1
2 X1
X3
C5
470p
1
2
X1
V4 LL4148
C2
100nF
4 X1
3 X1
-15V
-15V
6
5

Fig. 5-4-18s

5.4.18 PCB Preamp LLD Sipper Part 2 of 2
Layout Diagram

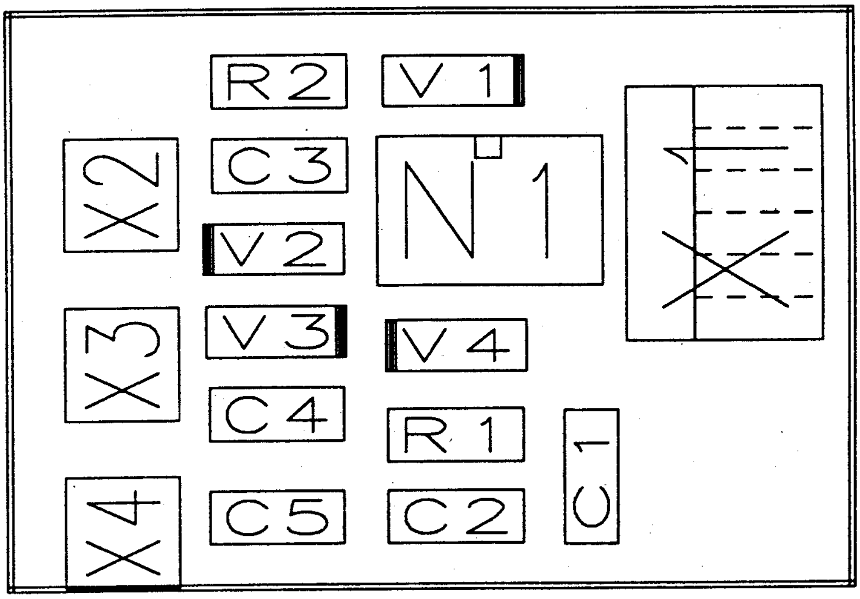

R2
V1
C3
N1
X2
V2
X1
X3
V3
V4
C4
R1
C1
X4
C5
C2

Fig. 5-4-18b

5.4.19 PCB LLD S/R Part 1 of 2 Printed Circuit Diagram

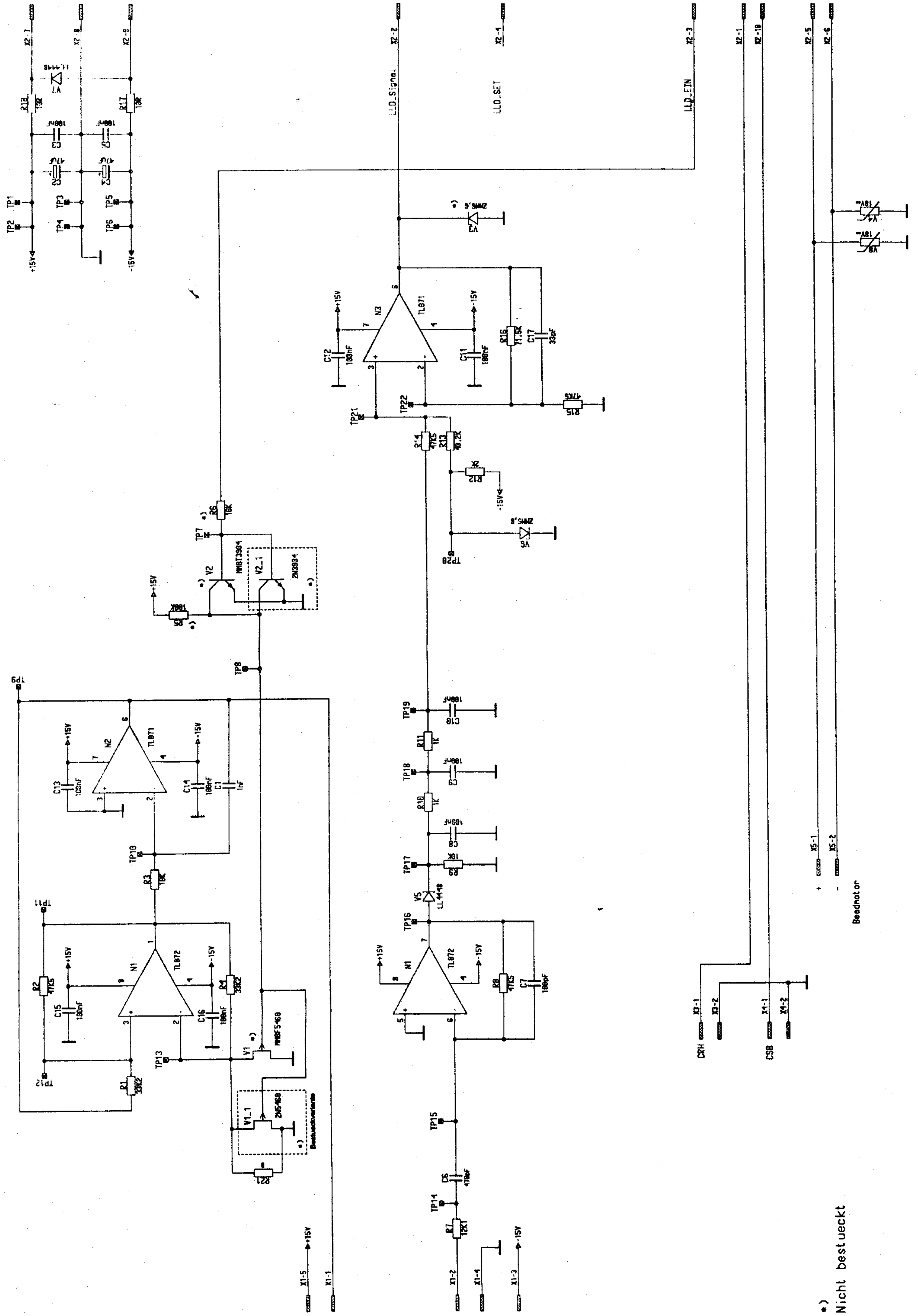

X2-7
X2-8
X2-9
X2-2
X2-4
X2-3
X2-1
X2-10
X2-5
X2-6
V7
LL4148
R18 10K
R17 10K
C3 100nF
C2 100nF
C5 47µ
C4 47µ
TP1
TP2
TP3
TP4
TP5
TP6
+15V
-15V
LLD_Signal
LLD_SET
LLD_EIN
V3 ZMM5,6 *)
V4 18V
V8 18V
N3 TL071
C12 100nF
C11 100nF
R16 71,5K
C17 33pF
TP21
TP22
R15 47K5
R14 47K5
R13 49,2K
R12 1K
V6 ZMM5,6 *)
TP28
R6 10K
TP7
V2 MMBT3904
V2_1 2N3904 *)
R5 100K *)
TP8
TP9
N2 TL071
C13 100nF
C14 100nF
C1 1nF
TP10
R3 10K
TP11
R2 47K5
N1 TL072
C15 100nF
C16 100nF
R4 33K2
V1 MMBF5460 *)
TP13
TP12
R1 33K2
V1_1 2N5460
Bestueckvariante *)
R21
X1-5
X1-1
TP19
C10 100nF
R11 1K
TP18
C9 100nF
R10 1K
C8 100nF
TP17
R9 10K
V5 LL4148
TP16
N1 TL072
R8 47K5
C7 100pF
TP15
C6 470nF
TP14
R7 12K1
X1-2
X1-4
X1-3
X3-1
X3-2
X4-1
X4-2
CRH
CSB
X5-1
X5-2
+
-
Beadmotor
*) Nicht bestueckt

Fig. 5-4-19s

5.4.19 PCB LLD S/R Part 2 of 2 Layout Diagram

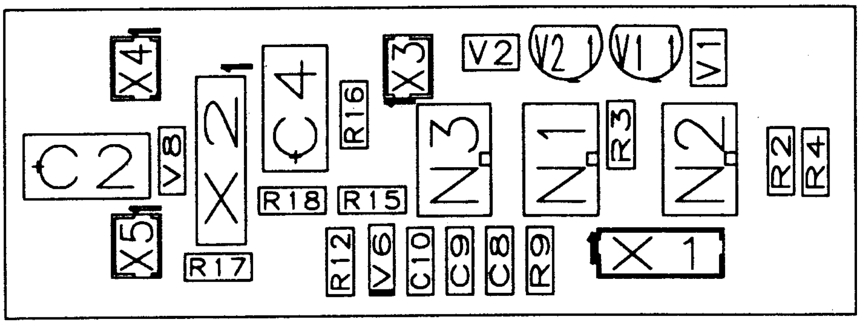

X4
C2
V8
X5
X2
R17
C4
R18
R16
R15
X3
V2
V2
V1
V1
N3
N1
R3
N2
R2
R4
R12
V6
C10
C9
C8
R9
X 1

Fig. 5-4-19b

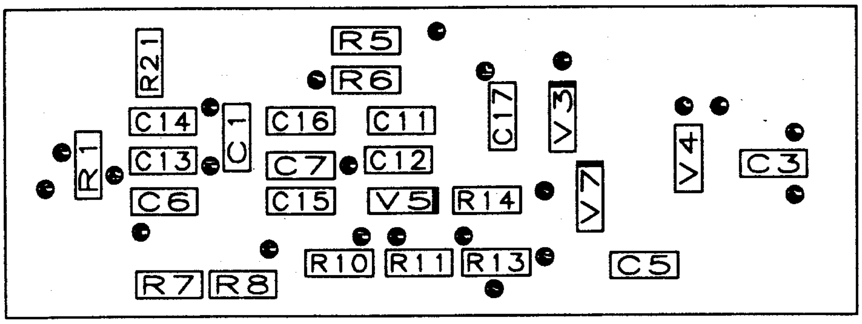

R21
R1
C14
C13
C6
C1
C16
C7
C15
R5
R6
C11
C12
V5
R14
C17
V3
V7
V4
C3
R7
R8
R10
R11
R13
C5

Fig. 5-4-192b

5.4.20 PCB LLD Sipper Part 1 of 2 Printed Circuit Diagram

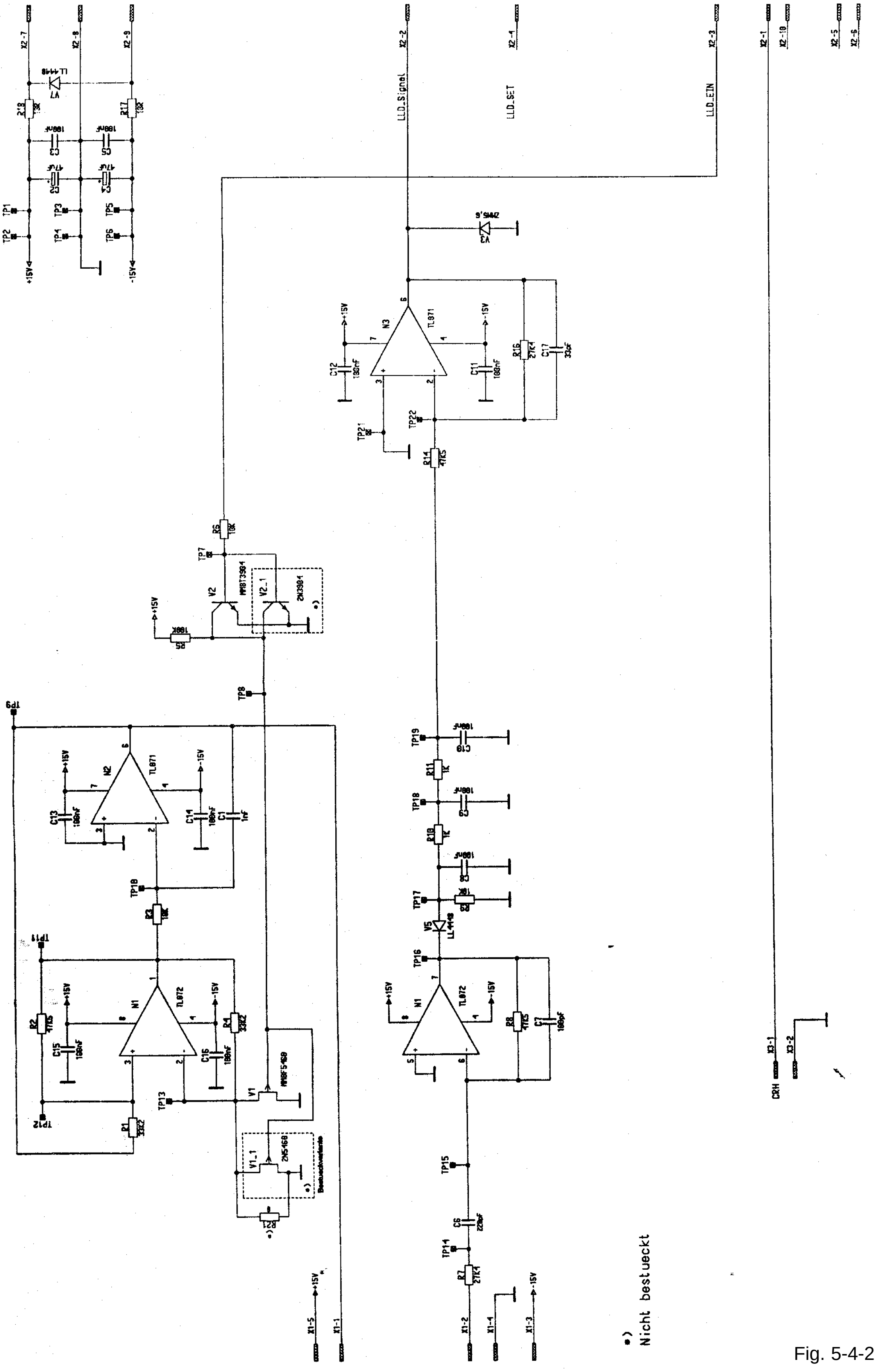

X2-7
X2-8
X2-9
X2-2
X2-4
X2-3
X2-1
X2-10
X2-5
X2-6
LLD.Signal
LLD.SET
LLD.EIN
V4
LL4448
R18 13K
R17 13K
C3 100nF
C5 100nF
C2 47uF
C4 47uF
TP1
TP2
TP3
TP4
TP5
TP6
+15V
-15V
V3
ZMM5,6
N3
TL071
C12 100nF
C11 100nF
R16 27K4
C17 33pF
TP21
TP22
R14 47K5
R6 10K
TP7
V2
MMBT3904
V2_1
2N3904
R5 100K
TP8
TP9
N2
TL071
C13 100nF
C14 100nF
C1 1nF
TP10
R3 10K
TP11
N1
TL072
R2 47K5
C15 100nF
C16 100nF
R4 33K2
TP12
TP13
R1 33K2
V1
MMBF5460
V1_1
2N5460
Bestueckvariante
R21
*)
X1-5
X1-1
X1-2
X1-4
X1-3
TP19
C10 100nF
R11 1K
TP18
C9 100nF
R10 1K
C8 100nF
TP17
R12 10K
V5
LL4448
TP16
R8 47K5
C7 100pF
TP15
C6 220nF
TP14
R7 27K4
X3-1
X3-2
CRH
*)
Nicht bestueckt

Fig. 5-4-20s

5.4.20 PCB LLD Sipper Part 2 of 2 Layout Diagram

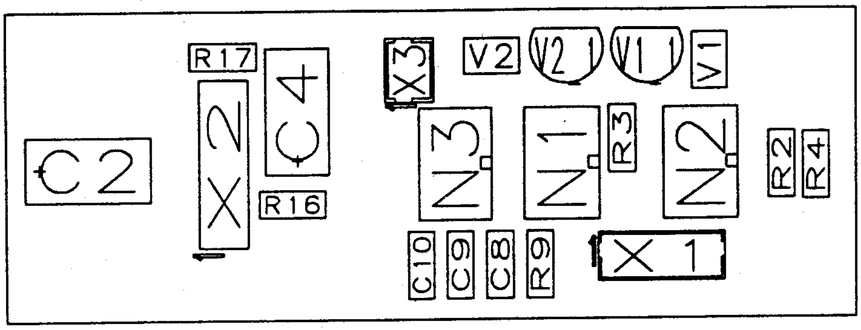

R17
C4
X3
V2
V2 1
V1 1
V1
C2
X2
R16
N3
N1
R3
N2
R2
R4
C10
C9
C8
R9
X1

Fig. 5-4-20b

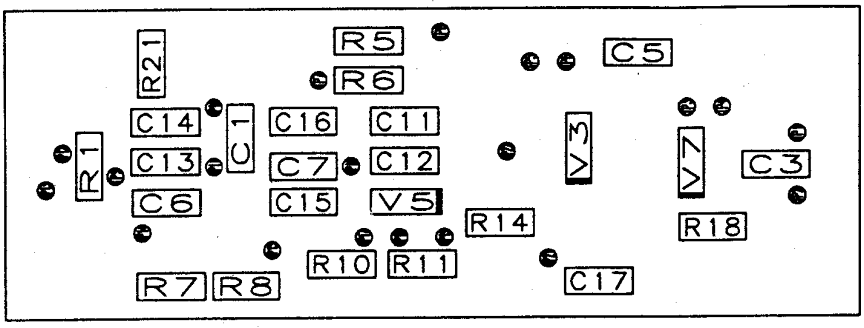

R21
R5
R6
C5
C14
C1
C16
C11
R1
C13
C7
C12
V3
V7
C3
C6
C15
V5
R14
R18
R10
R11
C17
R7
R8

Fig. 5-4-202b

5.4.21 Power Supply Assy Part 1 of 1 Functional Diagram

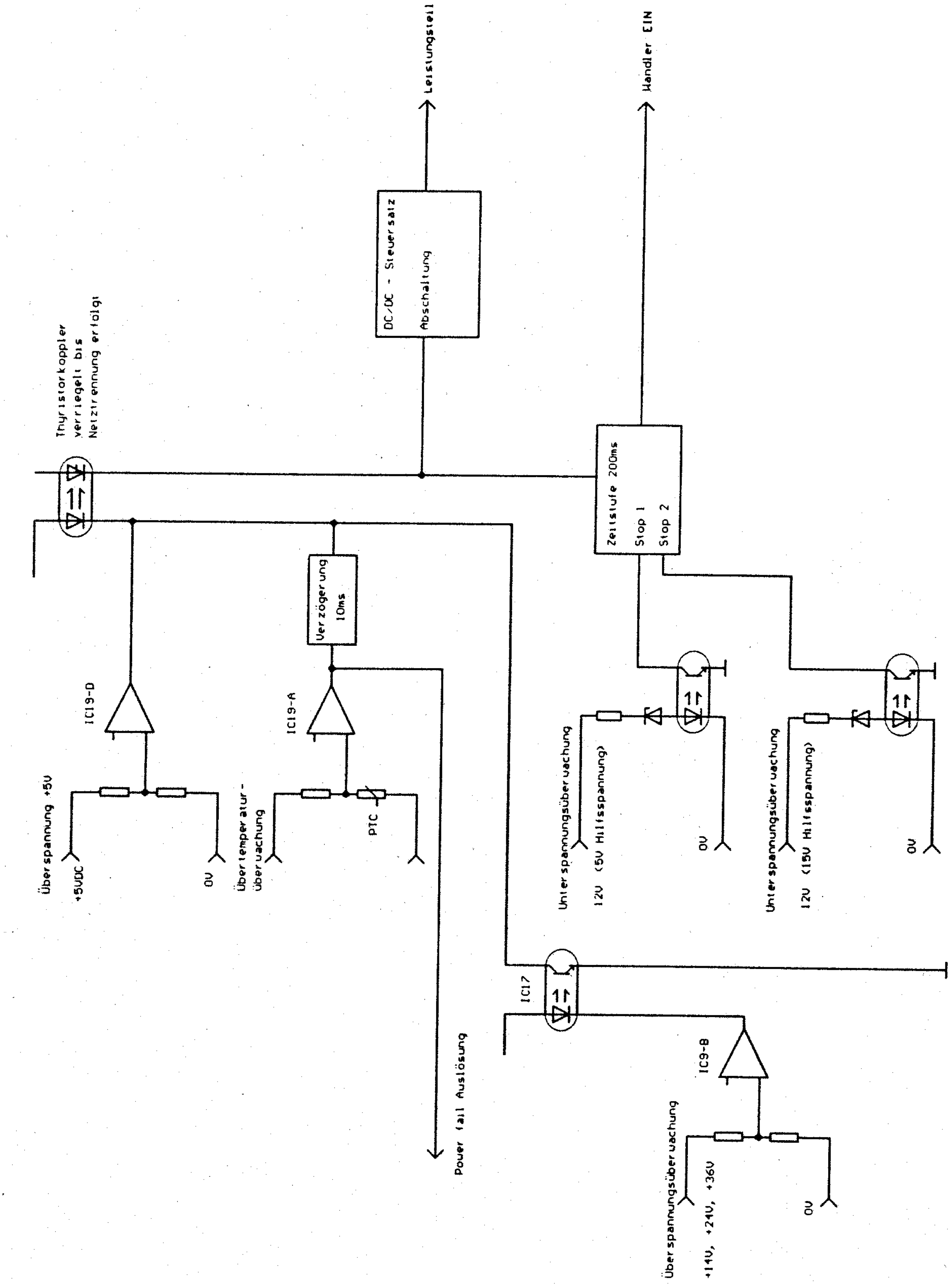

Leistungsteil
Wandler EIN
DC/DC - Steuersatz
Abschaltung
Thyristorkoppler
verriegelt bis
Netztrennung erfolgt
Zeitstufe 200ms
Stop 1
Stop 2
Verzögerung
10ms
IC19-D
IC19-A
Überspannung +5V
+5VDC
0V
Übertemperatur-
überwachung
PTC
Unterspannungsüberwachung
12V (5V Hilfsspannung)
0V
Unterspannungsüberwachung
12V (15V Hilfsspannung)
0V
IC17
IC9-B
Power fail Auslösung
Überspannungsüberwachung
+14V, +24V, +36V
0V

Fig. 5-4-210s

5.4.22 PCB Dist

5.4.22.1PCB Dist Fluid Part 1 of 2
Printed Circuit Diagram

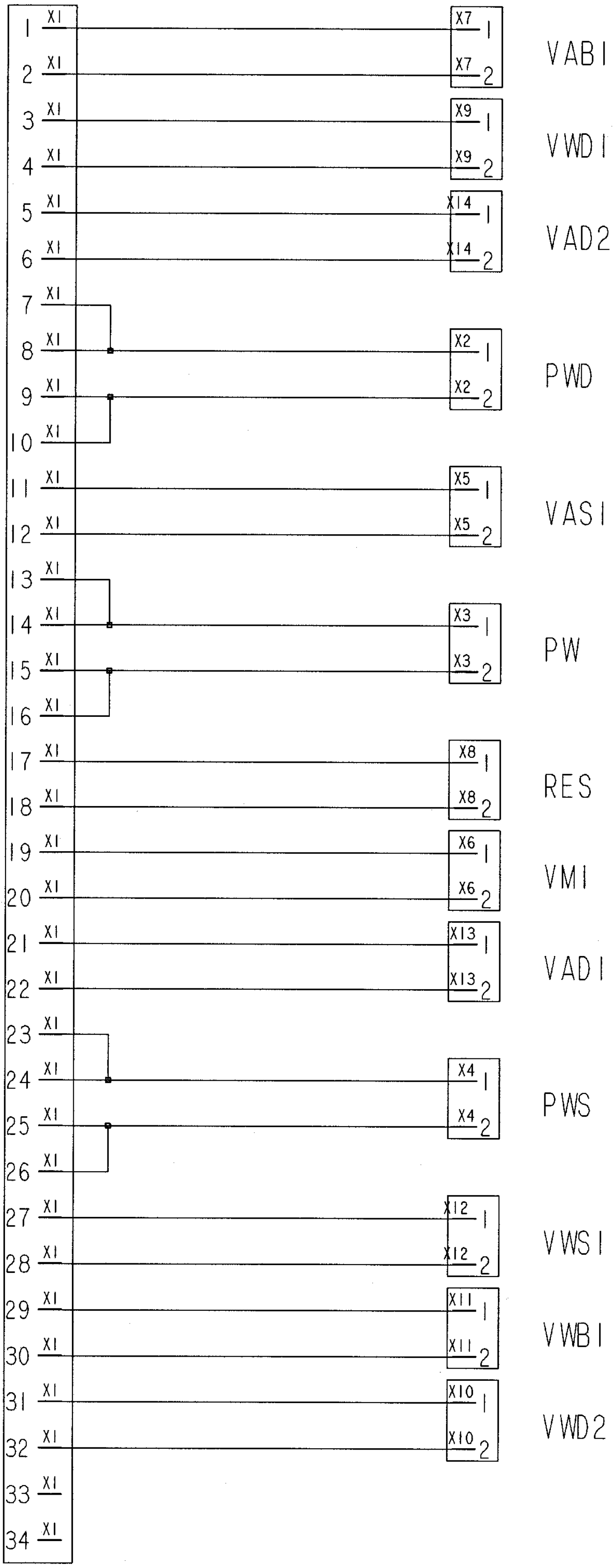

X1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
X7
X9
X14
X2
X5
X3
X8
X6
X13
X4
X12
X11
X10
VAB1
VWD1
VAD2
PWD
VAS1
PW
RES
VM1
VAD1
PWS
VWS1
VWB1
VWD2

Fig. 5-4-221s

5.4.22.1PCB Dist Fluid Part 2 of 2 Layout Diagram

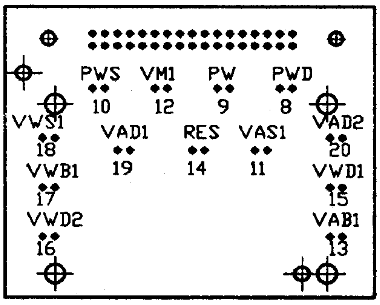

PWS
10
VM1
12
PW
9
PWD
8
VWS1
18
VAD1
19
RES
14
VAS1
11
VAD2
20
VWB1
17
VWD1
15
VWD2
16
VAB1
13

Fig. 5-4-221a

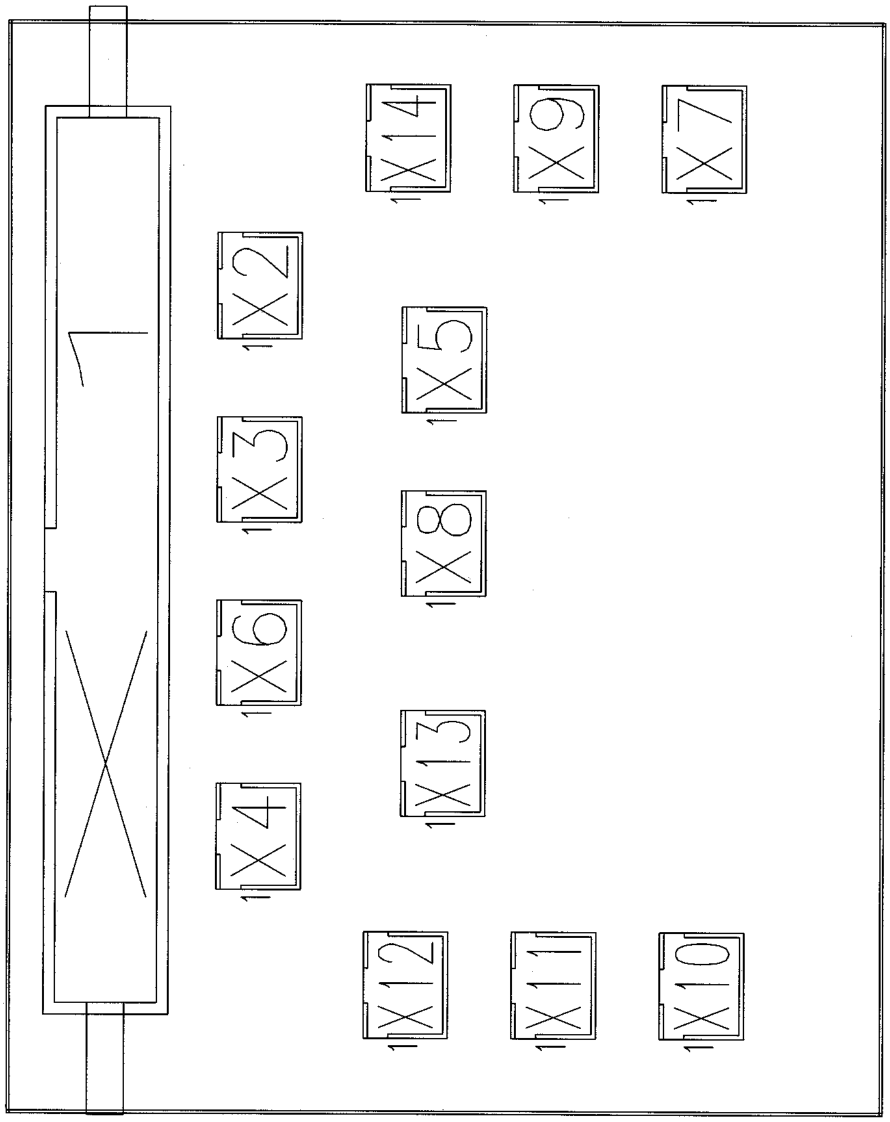

1
X14
X9
X7
X2
X5
X3
X8
X6
X13
X4
X12
X11
X10

Fig. 5-4-221b

5.4.22.2 PCB Dist Rotor/Rotor Part 1 of 2 Printed Circuit Diagram

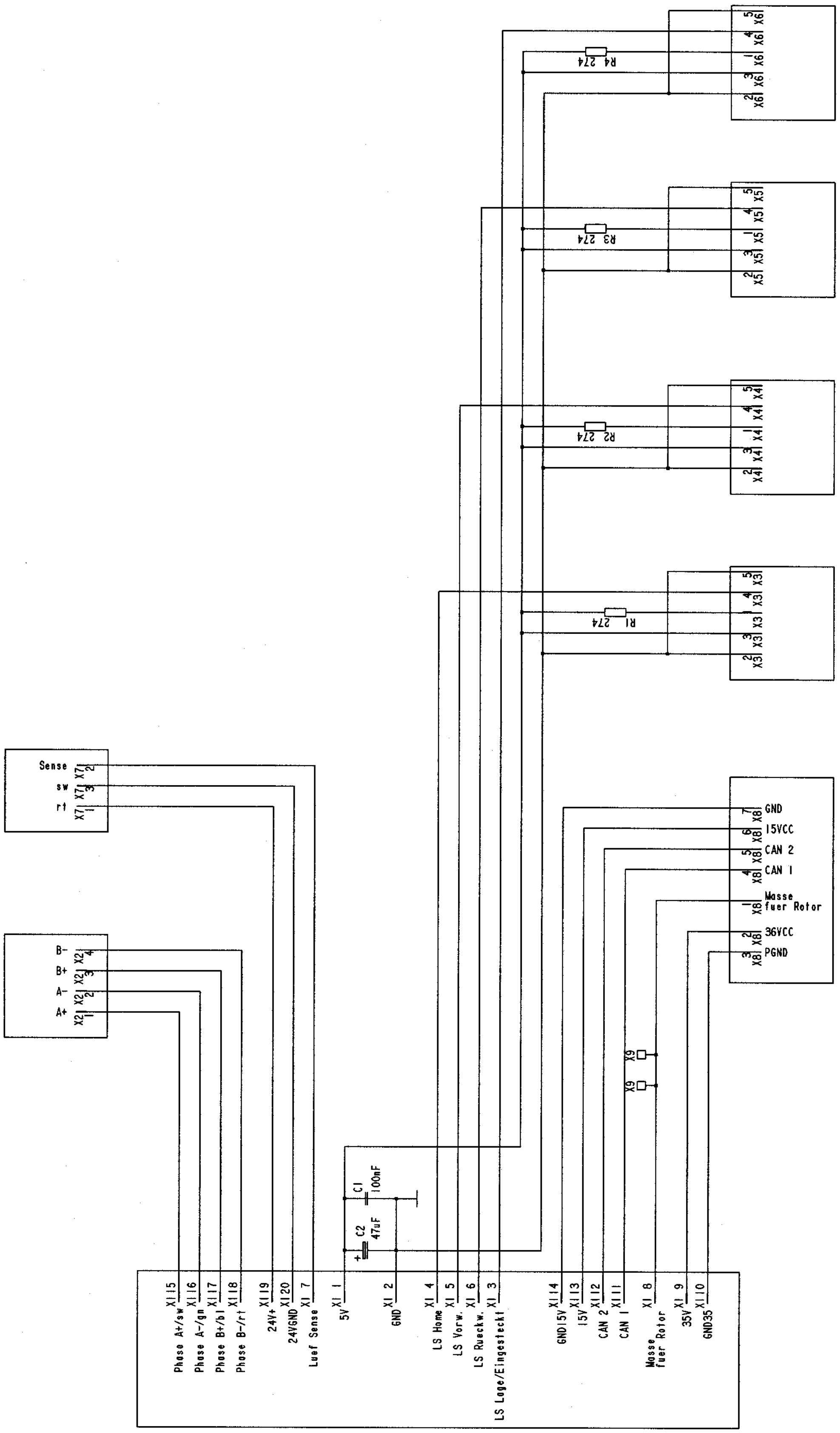

X6 5
X6 4
X6 1
X6 3
X6 2
R4 274
X5 5
X5 4
X5 1
X5 3
X5 2
R3 274
X4 5
X4 4
X4 1
X4 3
X4 2
R2 274
X3 5
X3 4
X3 1
X3 3
X3 2
R1 274
Sense X7 2
sw X7 3
rt X7 1
B- X2 4
B+ X2 3
A- X2 2
A+ X2 1
X8 7 GND
X8 6 15VCC
X8 5 CAN 2
X8 4 CAN 1
X8 1 Masse fuer Rotor
X8 2 36VCC
X8 3 PGND
X9
X9
C1 100nF
C2 47uF
+
X1 15 Phase A+/sw
X1 16 Phase A-/gn
X1 17 Phase B+/bl
X1 18 Phase B-/rt
X1 19 24V+
X1 20 24VGND
X1 7 Luef Sense
X1 1 5V
X1 2 GND
X1 4 LS Home
X1 5 LS Vorw.
X1 6 LS Rueckw.
X1 3 LS Lage/Eingesteckt
X1 14 GND15V
X1 13 15V
X1 12 CAN 2
X1 11 CAN 1
X1 8 Masse fuer Rotor
X1 9 35V
X1 10 GND35

Fig. 5-4-222s

5.4.22.2 PCB Dist Rotor/Rotor Part 2 of 2 Layout Diagram

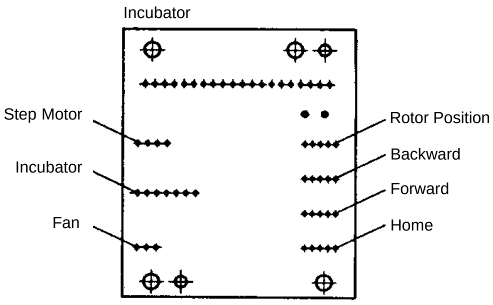

Incubator
Step Motor
Incubator
Fan
Rotor Position
Backward
Forward
Home

Fig. 5-4-222a

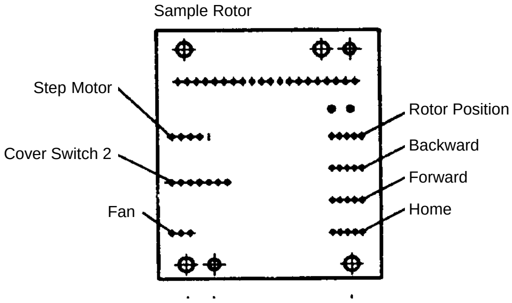

Sample Rotor
Step Motor
Cover Switch 2
Fan
Rotor Position
Backward
Forward
Home

Fig. 5-4-222c

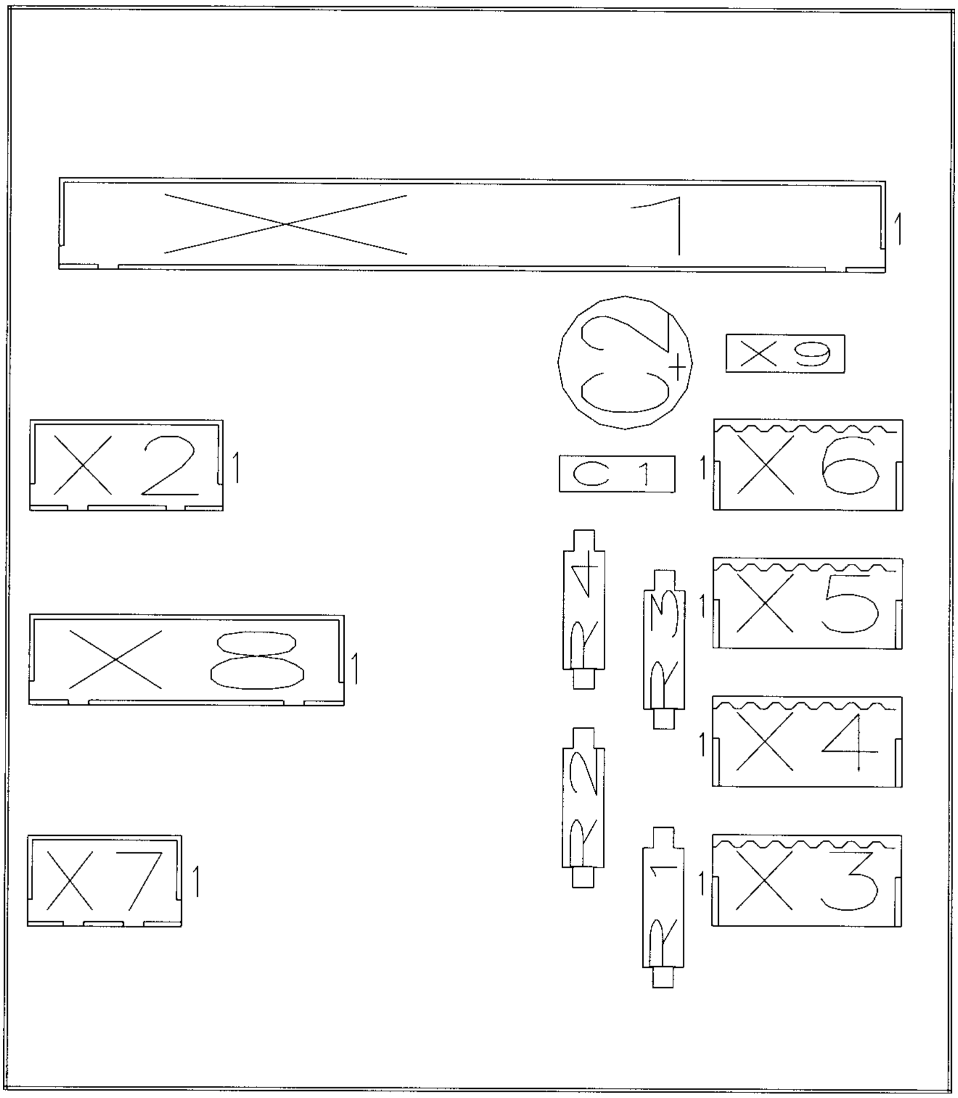

X1
1
C2
+
X9
X2
1
C1
1
X6
X8
1
R4
R3
1
X5
1
X4
R2
X7
1
R1
1
X3

Fig. 5-4-22b

5.4.22.3 PCB Dist Keyboard Part 1 of 2
Printed Circuit Diagram

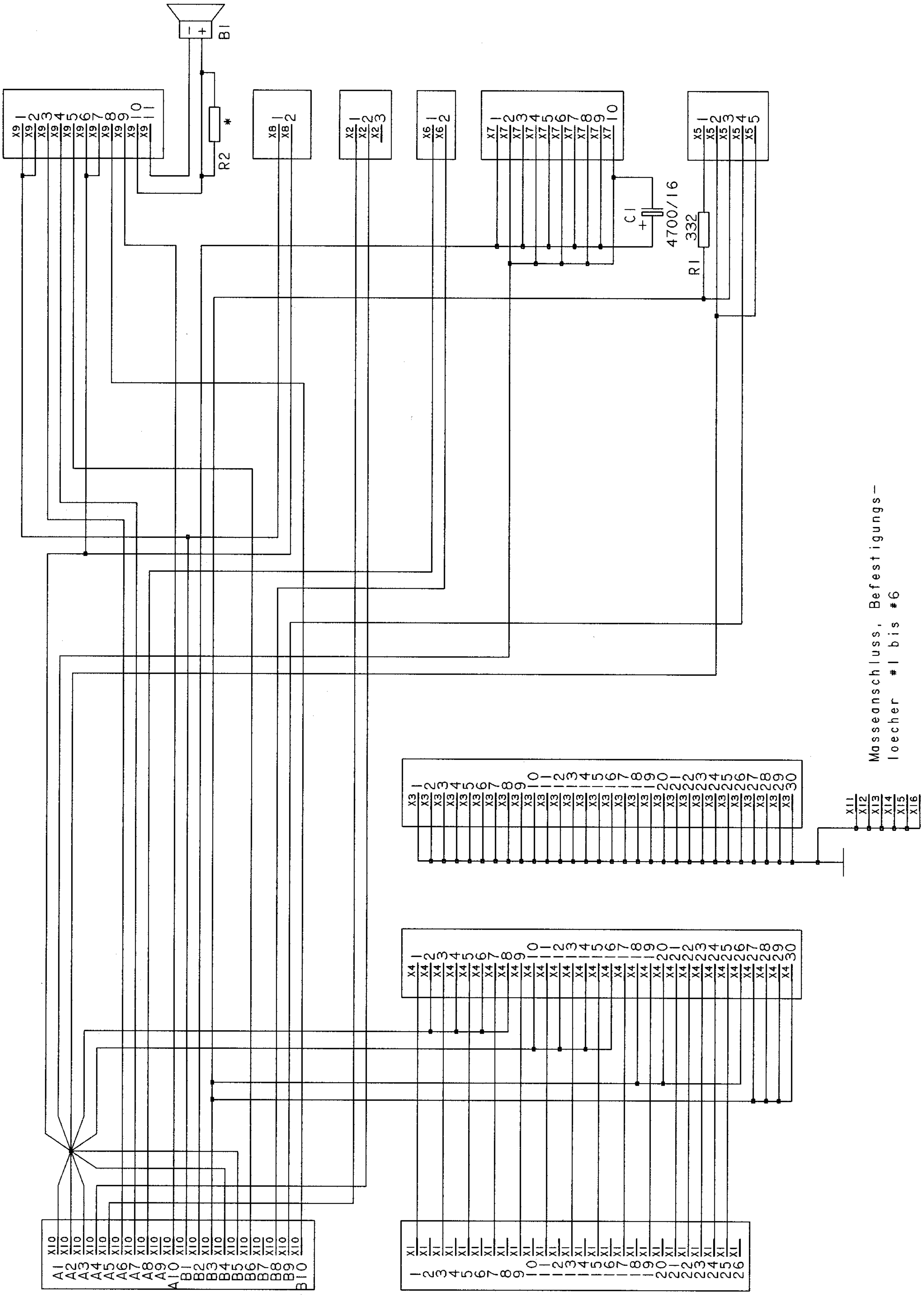

B1
R2
*
C1
4700/16
R1
332
X9
X8
X2
X6
X7
X5
X3
X4
X10
X1
X11
X12
X13
X14
X15
X16
Masseanschluss, Befestigungs-
loecher #1 bis #6

Fig. 5-4-223s

5.4.22.3 PCB Dist Keyboard Part 2 of 2
Layout Diagram

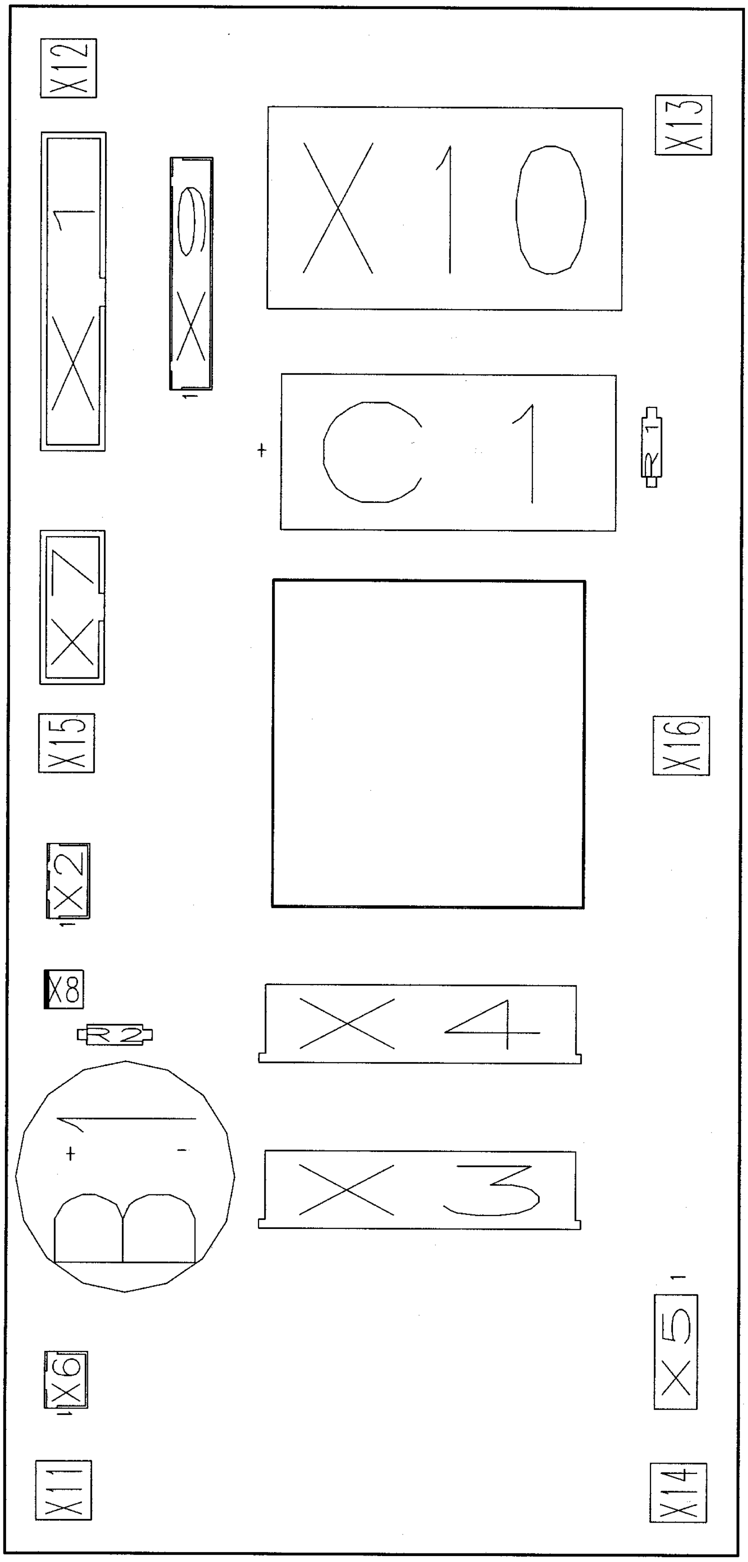

X12
X13
X1
X9
1
X10
+
C1
R1
X7
X15
X16
X2
1
X8
R2
X4
+
-
B1
X3
1
X5
X6
1
X11
X14

Fig. 5-4-223b

5.4.22.4 PCB Dist Keyboard Configuration 22
Part 1 of 4
Dip Switch Function on PCB Dist Keyboard

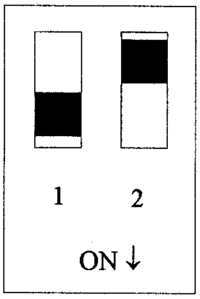
The new PCB Dist Keyboard has two 2-pole dip switches. These dips switches can be used to change the type and intensity of the audible alarm generated by the new (louder alarm-) and signal generator as follows:

Dip switch 1 (left)	Steady or intermittent tone
Dip switch 2 (right)	Loud or low

In this way it is possible to adjust the type and intensity of the audible alarm to suit the background noise in the lab to meet the customer’s specific requirements. The setting of the dip switches can be altered only by the technical service. The dip switches are easily accessible after having removed the cover of the instrument base.

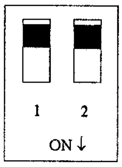
Default setting ex factory:

Steady tone	⇨	Dip switch 1 (left)	ON (down)
Loud	⇨	Dip switch 2 (right)	OFF (up)

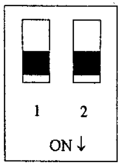


Other settings:

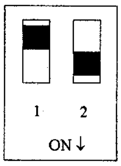
Steady tone	⇨	Dip switch 1 (left)	OFF (up)
Loud	⇨	Dip switch 2 (right)	OFF (up)



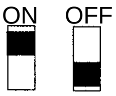
Steady tone	⇨	Dip switch 1 (left)	ON (down)
Low	⇨	Dip switch 2 (right)	ON (down)



Intermittent tone	⇨	Dip switch 1 (left)	OFF (up)
Low	⇨	Dip switch 2 (right)	ON (down)



Switch positions dip switches:



5.4.22.4 PCB Dist Keyboard Configuration 22
Part 2 of 4
Printed Circuit Diagram

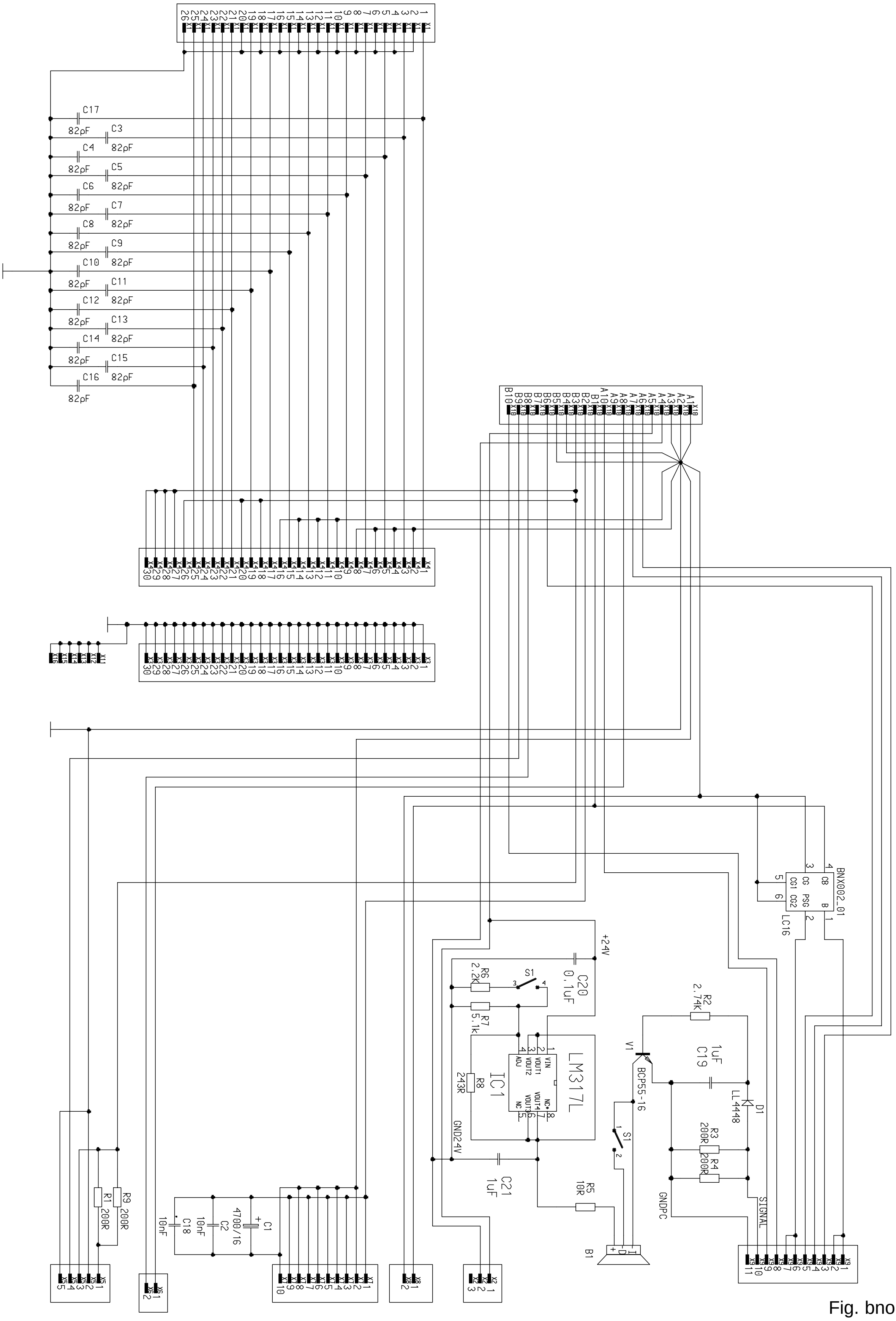


Fig. bnobstr

5.4.22.4 PCB Dist Keyboard Configuration 22
Part 3 of 4
Layout Diagram

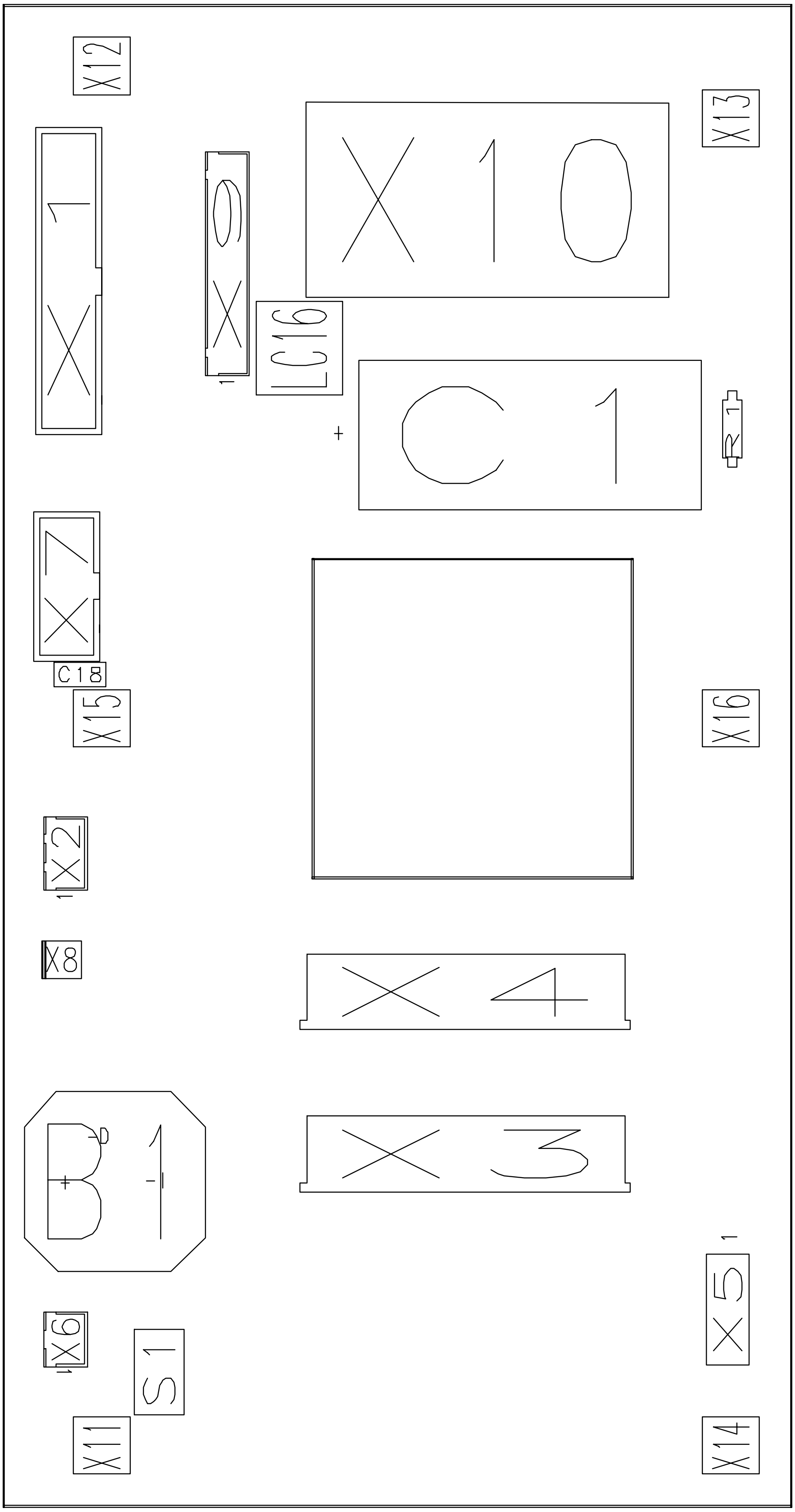

X12
X13
X10
X1
X9
LC16
C1
R1
X7
C18
X15
X16
X2
X8
X4
B1
X3
X5
X6
S1
X11
X14

Fig. bnobest1

5.4.22.4 PCB Dist Keyboard Configuration 22
Part 4 of 4
Layout Diagram

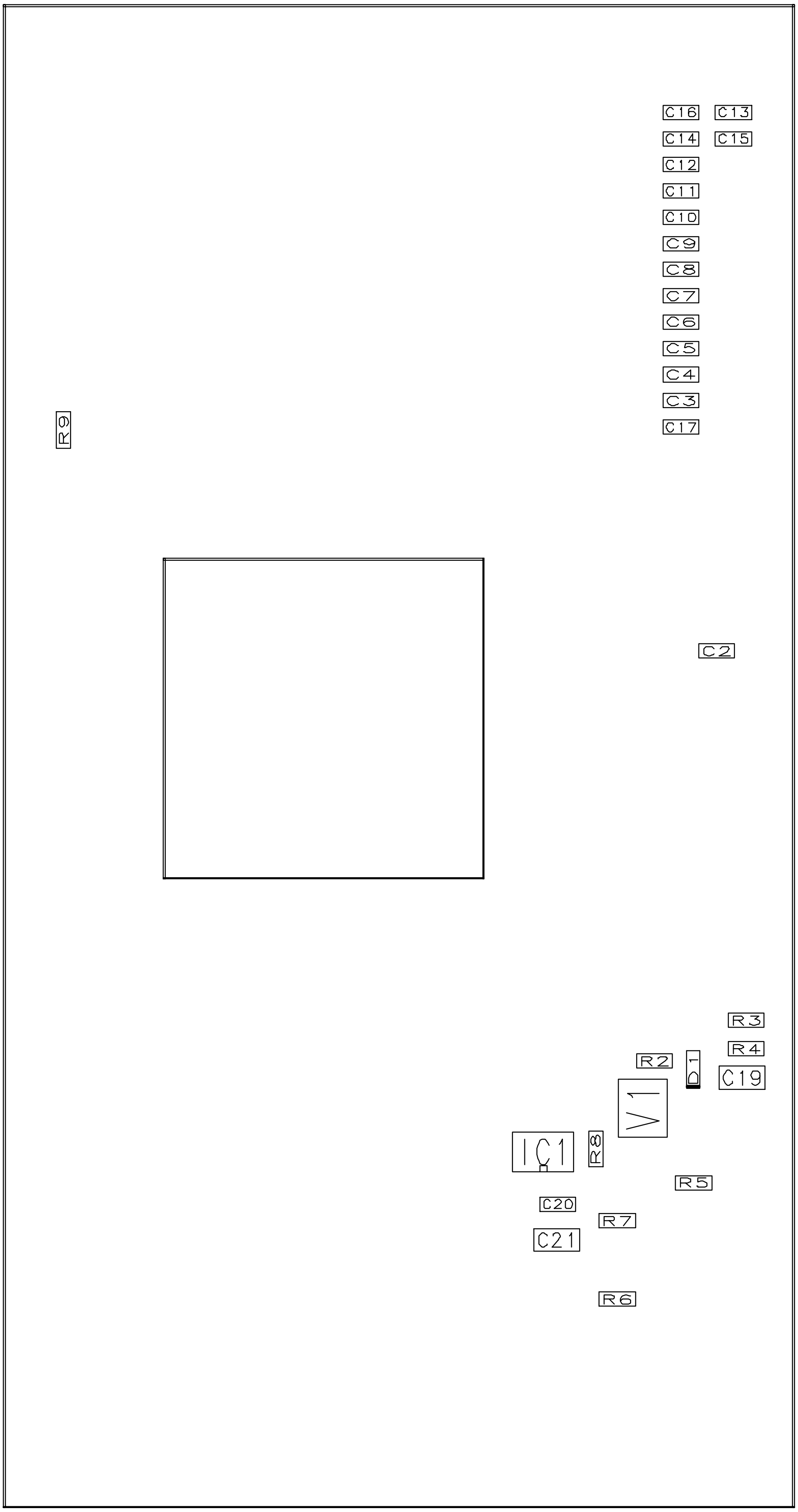

C16
C13
C14
C15
C12
C11
C10
C9
C8
C7
C6
C5
C4
C3
C17
R9
C2
R3
R4
R2
D1
C19
V1
IC1
R8
R5
C20
R7
C21
R6

Fig. bnobest2

5.4.22.5 PCB Dist Detection Module Part 1 of 2 Printed Circuit Diagram

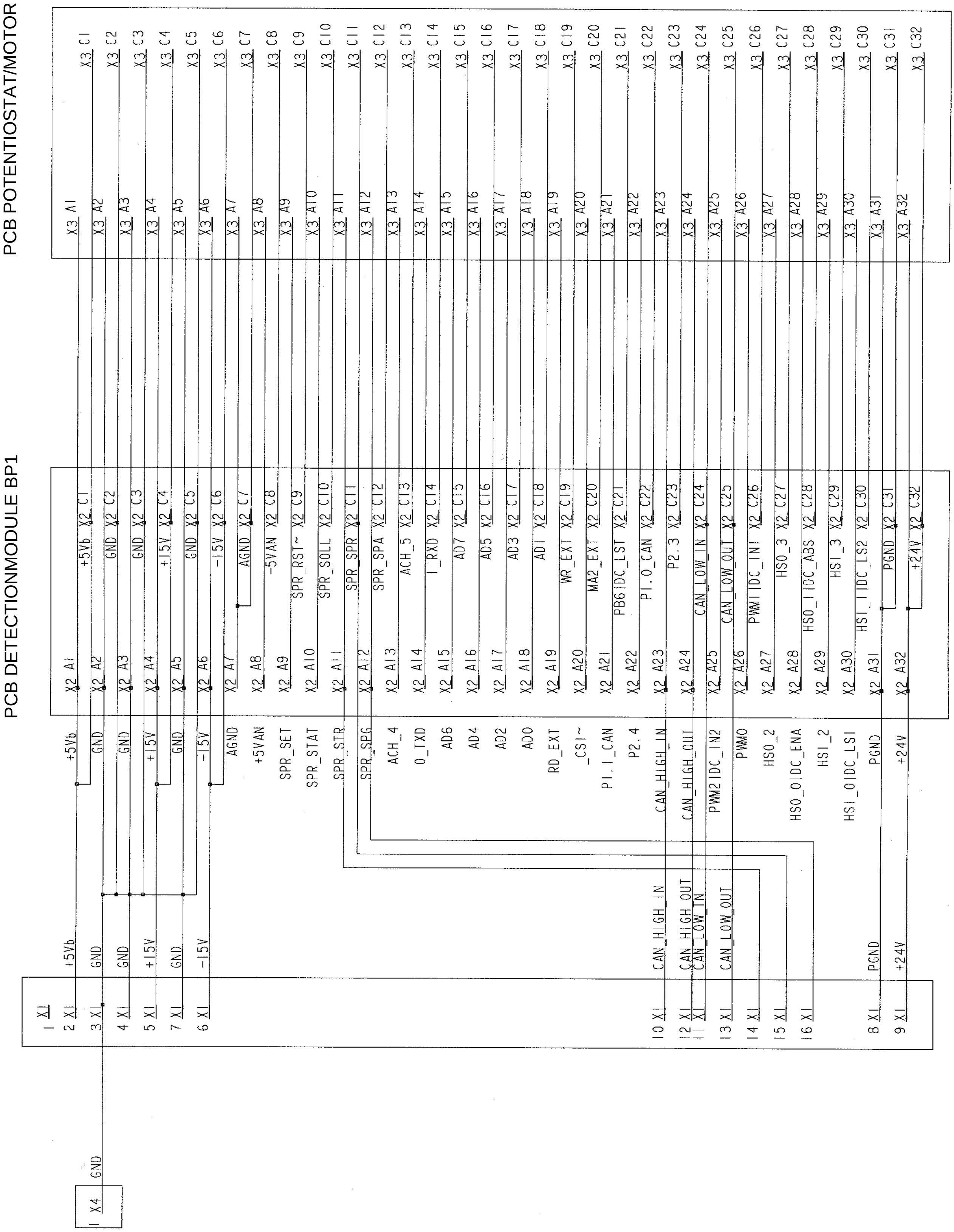

PCB POTENTIOSTAT/MOTOR
PCB DETECTIONMODULE BP1
X3 A1 … X3 A32
X3 C1 … X3 C32
+5Vb X2 C1
GND X2 C2
GND X2 C3
+15V X2 C4
GND X2 C5
-15V X2 C6
AGND X2 C7
-5VAN X2 C8
SPR_RST~ X2 C9
SPR_SOLL X2 C10
SPR_SPR X2 C11
SPR_SPA X2 C12
ACH_5 X2 C13
I_RXD X2 C14
AD7 X2 C15
AD5 X2 C16
AD3 X2 C17
AD1 X2 C18
WR_EXT X2 C19
MA2_EXT X2 C20
PB6IDC_LST X2 C21
P1.0_CAN X2 C22
P2.3 X2 C23
CAN_LOW_IN X2 C24
CAN_LOW_OUT X2 C25
PWM1IDC_IN1 X2 C26
HSO_3 X2 C27
HSO_1IDC_ABS X2 C28
HSI_3 X2 C29
HSI_1IDC_LS2 X2 C30
PGND X2 C31
+24V X2 C32
X2 A1 … X2 A32
+5Vb
GND
GND
+15V
GND
-15V
AGND
+5VAN
SPR_SET
SPR_STAT
SPR_STR
SPR_SPG
ACH_4
O_TXD
AD6
AD4
AD2
AD0
RD_EXT
_CS1~
P1.1_CAN
P2.4
CAN_HIGH_IN
CAN_HIGH_OUT
PWM2IDC_IN2
PWM0
HSO_2
HSO_0IDC_ENA
HSI_2
HSI_0IDC_LSI
PGND
+24V
+5Vb
GND
GND
+15V
GND
-15V
CAN_HIGH_IN
CAN_HIGH_OUT
CAN_LOW_IN
CAN_LOW_OUT
PGND
+24V
1 X1
2 X1
3 X1
4 X1
5 X1
7 X1
6 X1
10 X1
12 X1
11 X1
13 X1
14 X1
15 X1
16 X1
8 X1
9 X1
GND
1 X4

Fig. 5-4-224s

5.4.22.5 PCB Dist Detection Module Part 2 of 2 Layout Diagram

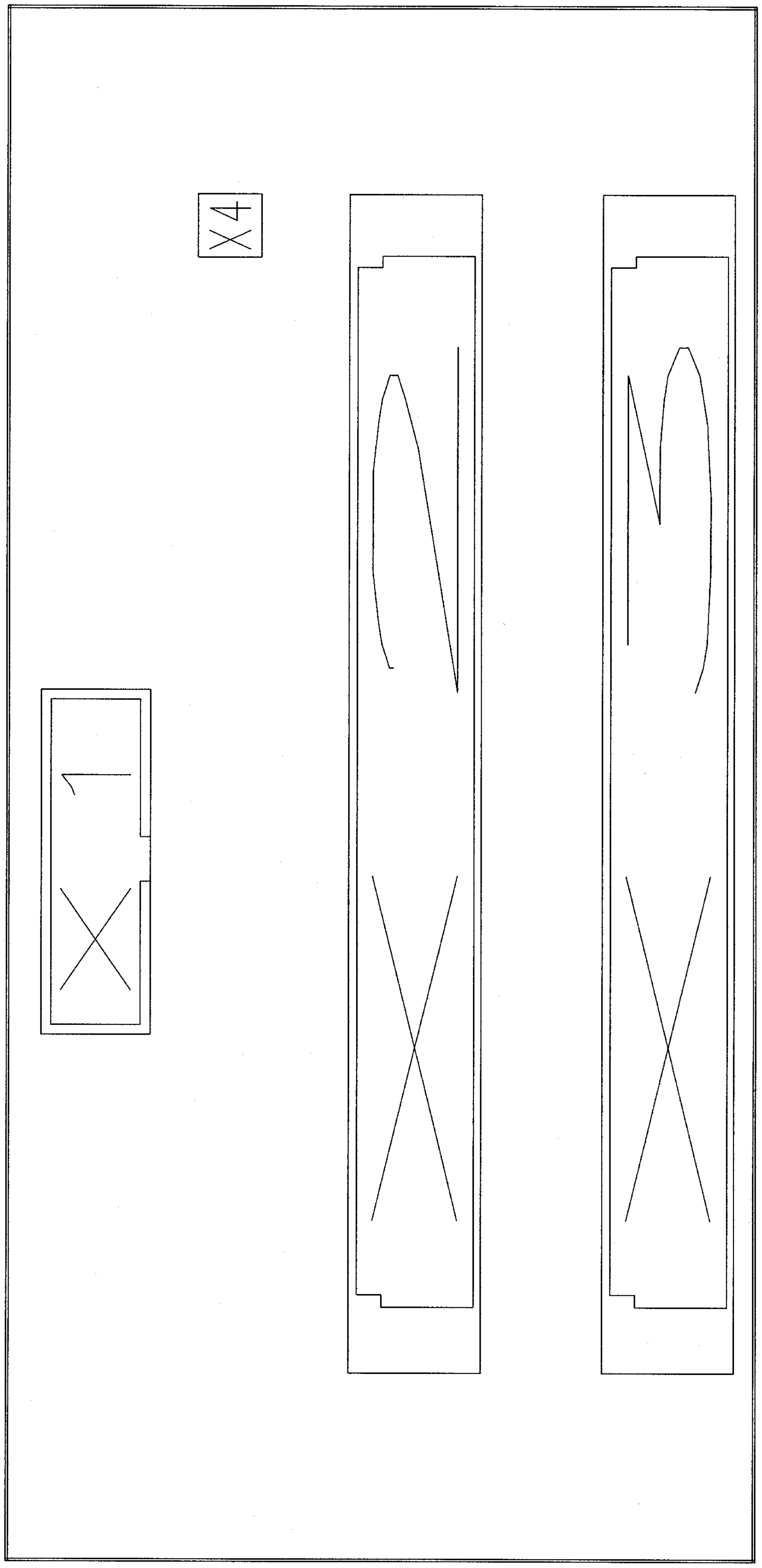
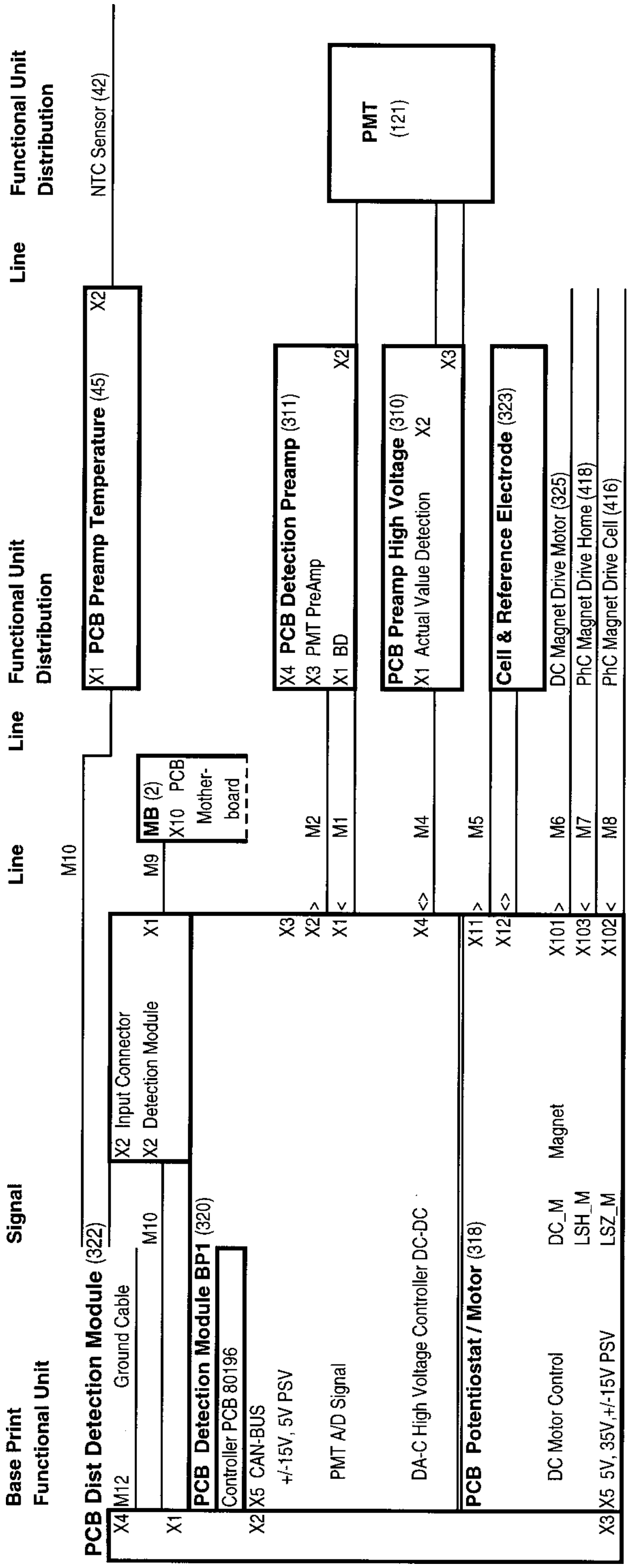
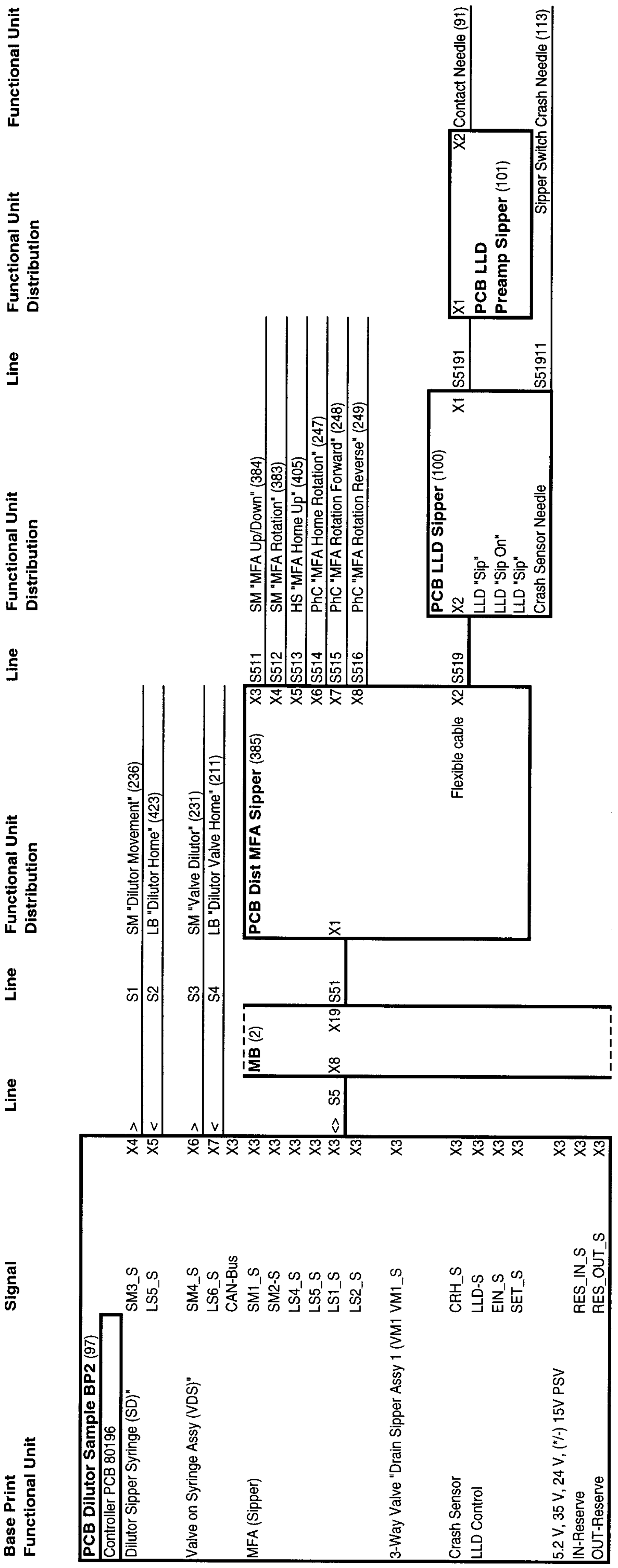


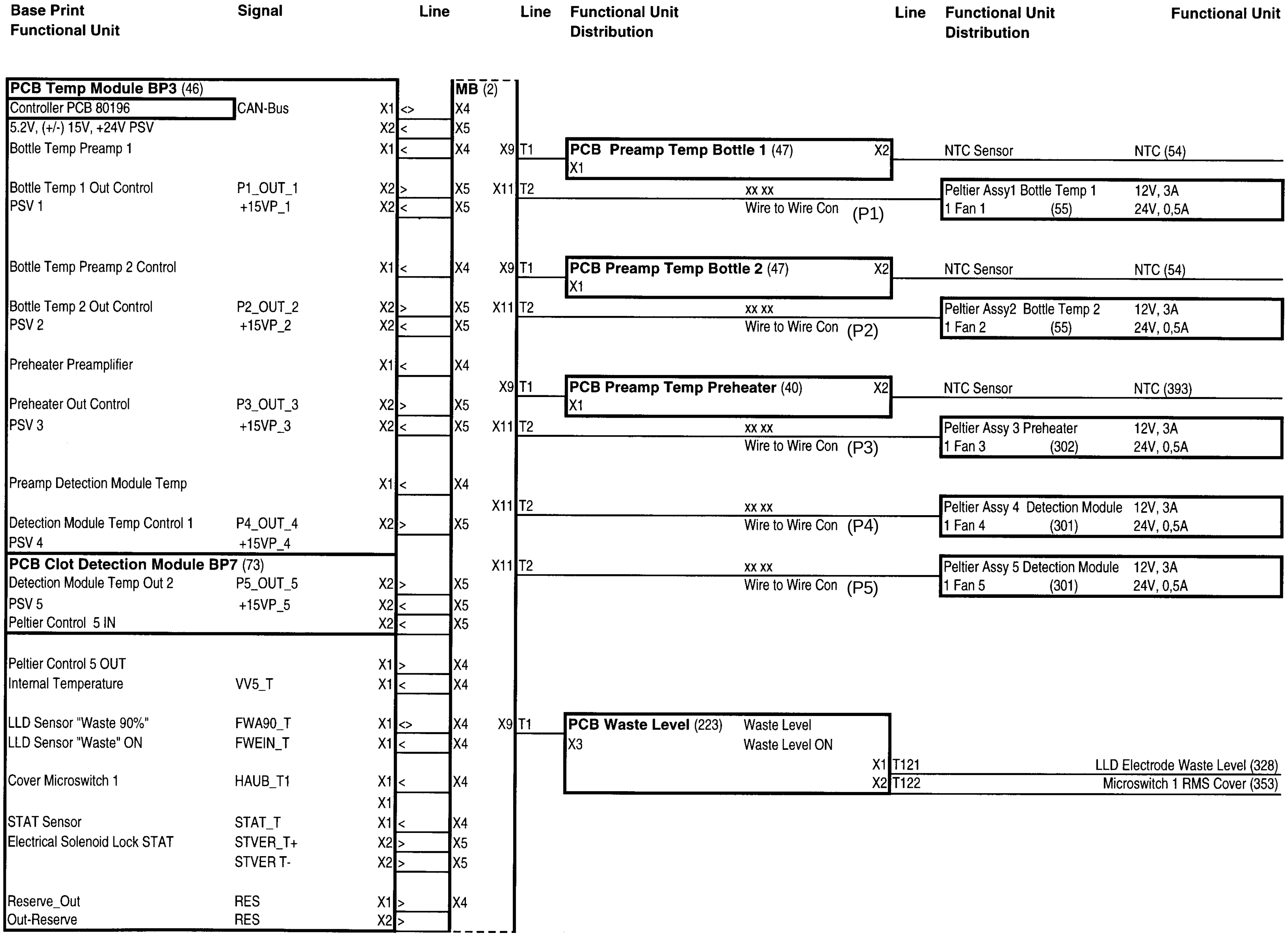
Fig. 5-4-224b

5.5 Wiring

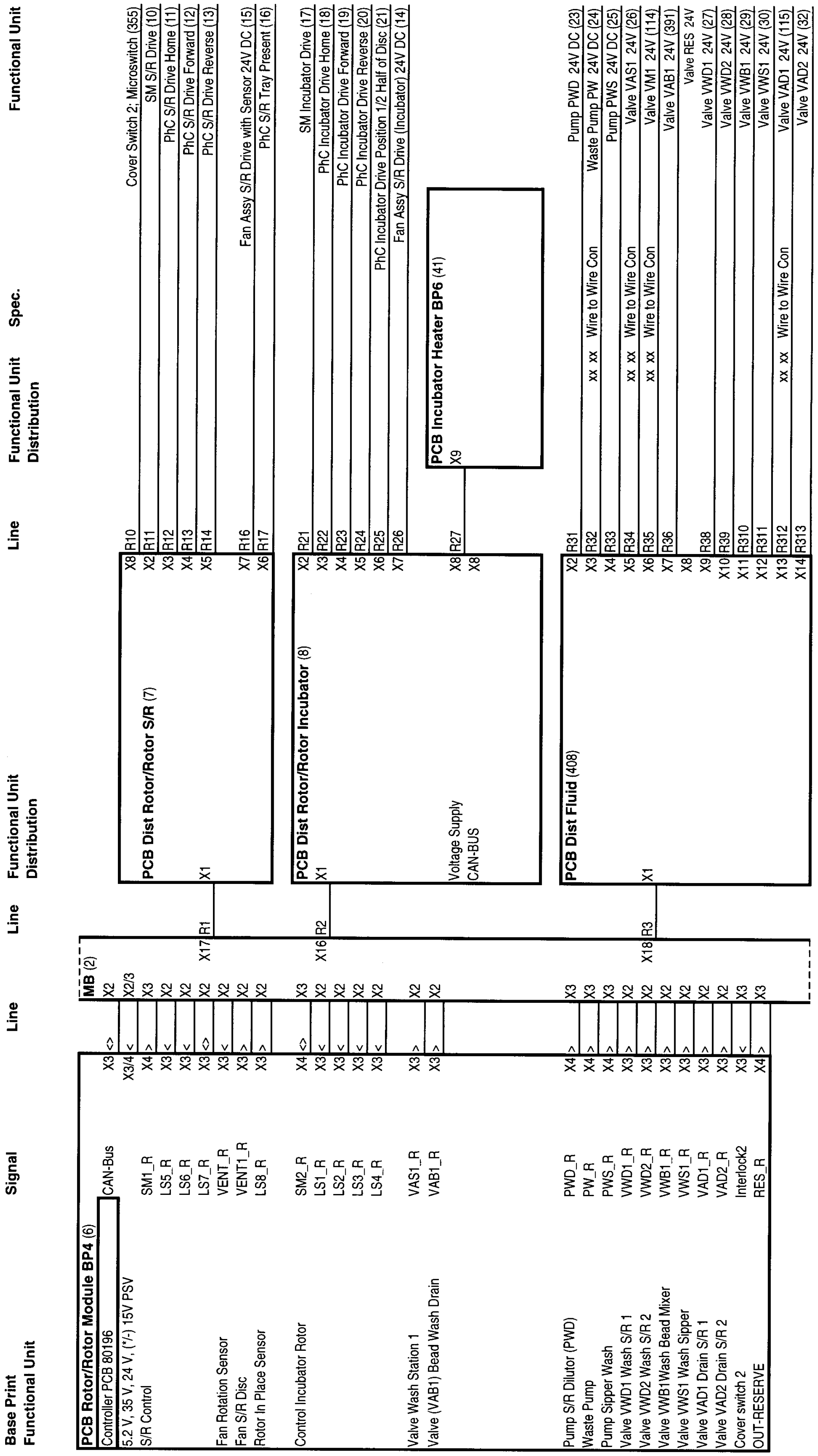
5.5.1 Overview (Block Diagram)

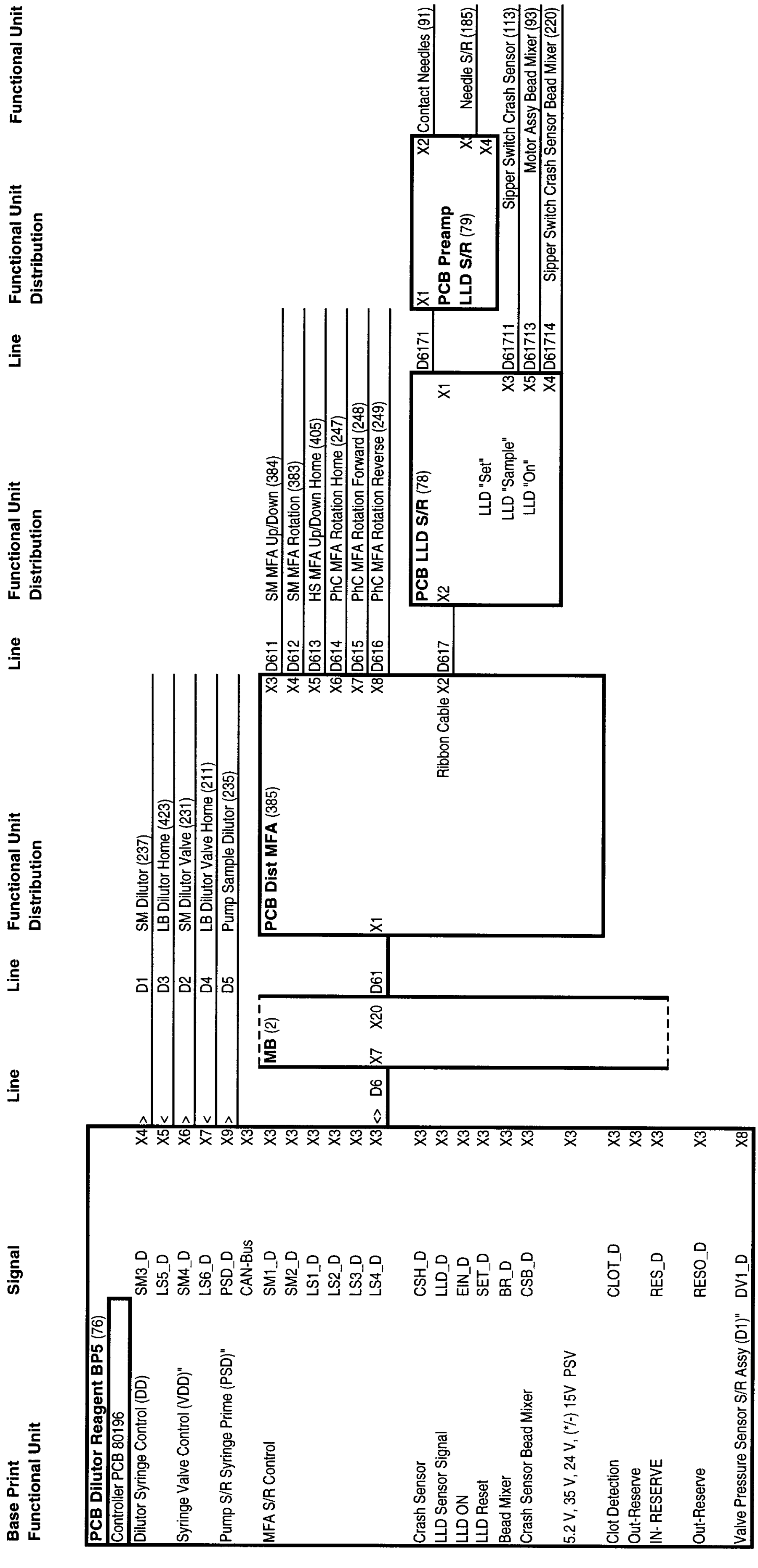

Base Print
Functional Unit
Signal
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
PCB Dist Detection Module (322)
X4 M12 Ground Cable
M10
X2 Input Connector
X2 Detection Module X1
X1
PCB Detection Module BP1 (320)
Controller PCB 80196
X2 X5 CAN-BUS
+/-15V, 5V PSV
PMT A/D Signal
DA-C High Voltage Controller DC-DC
PCB Potentiostat / Motor (318)
DC Motor Control DC_M Magnet
LSH_M
X3 X5 5V, 35V,+/-15V PSV LSZ_M
X3
X2 >
X1 <
X4 <>
X11 >
X12 <>
X101 >
X103 <
X102 <
M10
M9
M2
M1
M4
M5
M6
M7
M8
MB (2)
X10 PCB
Mother-
board
X1 PCB Preamp Temperature (45) X2
NTC Sensor (42)
X4 PCB Detection Preamp (311)
X3 PMT PreAmp
X1 BD X2
PCB Preamp High Voltage (310)
X1 Actual Value Detection X2
X3
PMT
(121)
Cell & Reference Electrode (323)
DC Magnet Drive Motor (325)
PhC Magnet Drive Home (418)
PhC Magnet Drive Cell (416)

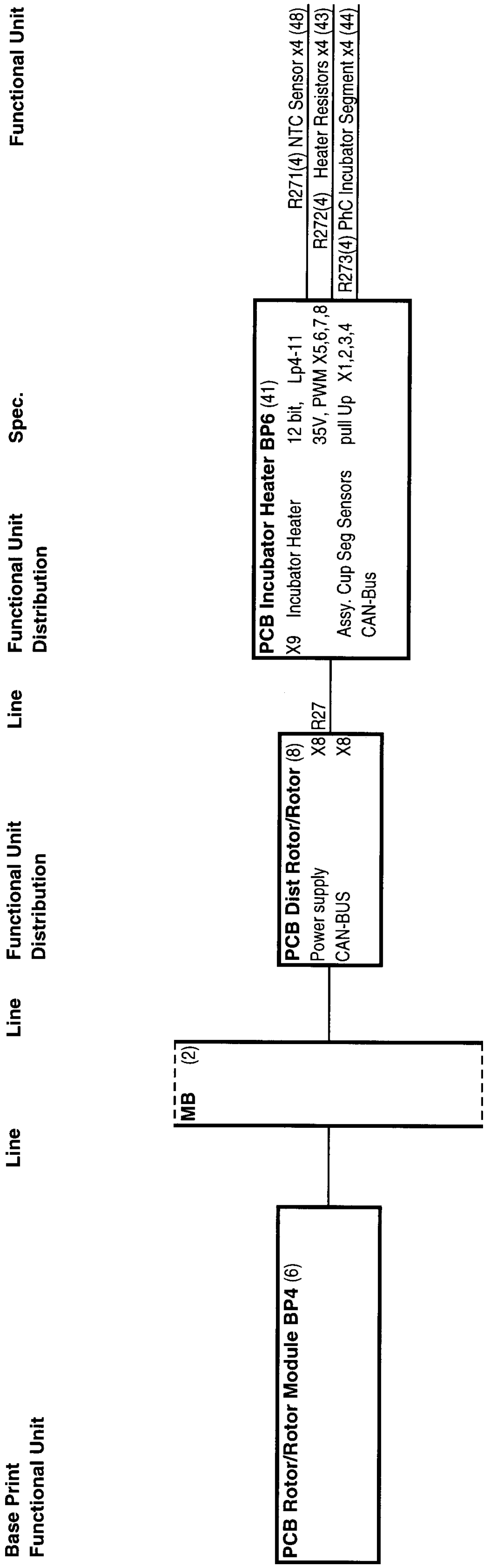

Base Print
Functional Unit
Signal
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Functional Unit
PCB Dilutor Sample BP2 (97)
Controller PCB 80196
Dilutor Sipper Syringe (SD)"
Valve on Syringe Assy (VDS)"
MFA (Sipper)
3-Way Valve "Drain Sipper Assy 1 (VM1 VM1_S
Crash Sensor
LLD Control
5.2 V, 35 V, 24 V, (*/-) 15V PSV
IN-Reserve
OUT-Reserve
SM3_S
LS5_S
SM4_S
LS6_S
CAN-Bus
SM1_S
SM2-S
LS4_S
LS5_S
LS1_S
LS2_S
CRH_S
LLD-S
EIN_S
SET_S
RES_IN_S
RES_OUT_S
X4
X5
X6
X7
X3
S5
MB (2)
X8
X19
S51
S1
S2
S3
S4
SM "Dilutor Movement" (236)
LB "Dilutor Home" (423)
SM "Valve Dilutor" (231)
LB "Dilutor Valve Home" (211)
PCB Dist MFA Sipper (385)
X1
Flexible cable
X2
S511
S512
S513
S514
S515
S516
S519
SM "MFA Up/Down" (384)
SM "MFA Rotation" (383)
HS "MFA Home Up" (405)
PhC "MFA Home Rotation" (247)
PhC "MFA Rotation Forward" (248)
PhC "MFA Rotation Reverse" (249)
PCB LLD Sipper (100)
LLD "Sip"
LLD "Sip On"
LLD "Sip"
Crash Sensor Needle
S5191
S51911
PCB LLD
Preamp Sipper (101)
Contact Needle (91)
Sipper Switch Crash Needle (113)

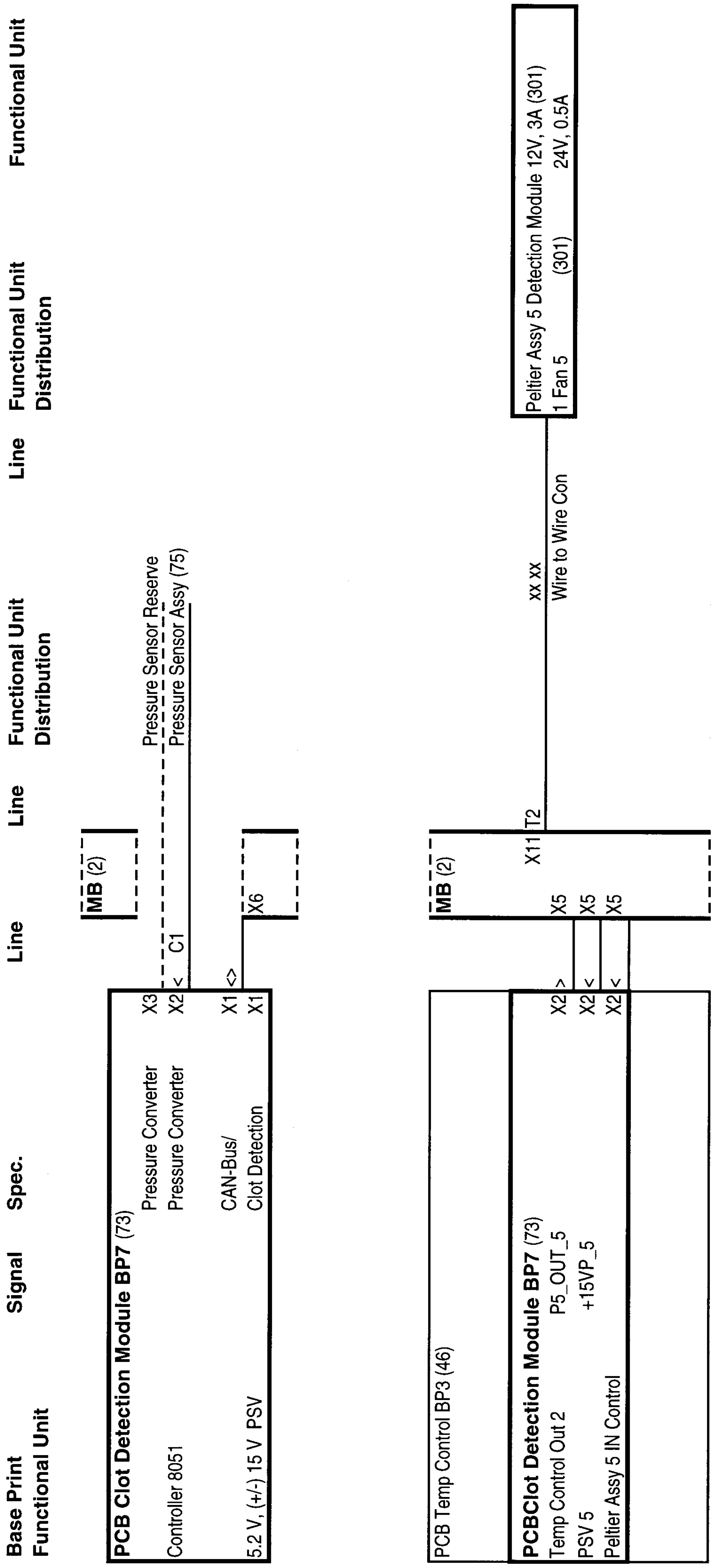

Base Print Functional Unit
Signal
Line
Line
Functional Unit Distribution
Line
Functional Unit Distribution
Functional Unit
PCB Temp Module BP3 (46)
Controller PCB 80196
CAN-Bus
X1 <> X4
5.2V, (+/-) 15V, +24V PSV
X2 < X5
Bottle Temp Preamp 1
X1 < X4
X9 T1
PCB Preamp Temp Bottle 1 (47)
X1
X2
NTC Sensor
NTC (54)
Bottle Temp 1 Out Control
P1_OUT_1
X2 > X5
PSV 1
+15VP_1
X2 < X5
X11 T2
xx xx
Wire to Wire Con
(P1)
Peltier Assy1 Bottle Temp 1
1 Fan 1
(55)
12V, 3A
24V, 0,5A
Bottle Temp Preamp 2 Control
X1 < X4
X9 T1
PCB Preamp Temp Bottle 2 (47)
X1
X2
NTC Sensor
NTC (54)
Bottle Temp 2 Out Control
P2_OUT_2
X2 > X5
PSV 2
+15VP_2
X2 < X5
X11 T2
xx xx
Wire to Wire Con
(P2)
Peltier Assy2 Bottle Temp 2
1 Fan 2
(55)
12V, 3A
24V, 0,5A
Preheater Preamplifier
X1 < X4
X9 T1
PCB Preamp Temp Preheater (40)
X1
X2
NTC Sensor
NTC (393)
Preheater Out Control
P3_OUT_3
X2 > X5
PSV 3
+15VP_3
X2 < X5
X11 T2
xx xx
Wire to Wire Con
(P3)
Peltier Assy 3 Preheater
1 Fan 3
(302)
12V, 3A
24V, 0,5A
Preamp Detection Module Temp
X1 < X4
Detection Module Temp Control 1
P4_OUT_4
X2 > X5
PSV 4
+15VP_4
X11 T2
xx xx
Wire to Wire Con
(P4)
Peltier Assy 4 Detection Module
1 Fan 4
(301)
12V, 3A
24V, 0,5A
PCB Clot Detection Module BP7 (73)
Detection Module Temp Out 2
P5_OUT_5
X2 > X5
PSV 5
+15VP_5
X2 < X5
Peltier Control 5 IN
X2 < X5
X11 T2
xx xx
Wire to Wire Con
(P5)
Peltier Assy 5 Detection Module
1 Fan 5
(301)
12V, 3A
24V, 0,5A
Peltier Control 5 OUT
X1 > X4
Internal Temperature
VV5_T
X1 < X4
LLD Sensor "Waste 90%"
FWA90_T
X1 <> X4
X9 T1
PCB Waste Level (223)
X3
Waste Level
Waste Level ON
LLD Sensor "Waste" ON
FWEIN_T
X1 < X4
X1 T121
LLD Electrode Waste Level (328)
X2 T122
Microswitch 1 RMS Cover (353)
Cover Microswitch 1
HAUB_T1
X1 < X4
X1
STAT Sensor
STAT_T
X1 < X4
Electrical Solenoid Lock STAT
STVER_T+
X2 > X5
STVER T-
X2 > X5
Reserve_Out
RES
X1 > X4
Out-Reserve
RES
X2 >
MB (2)

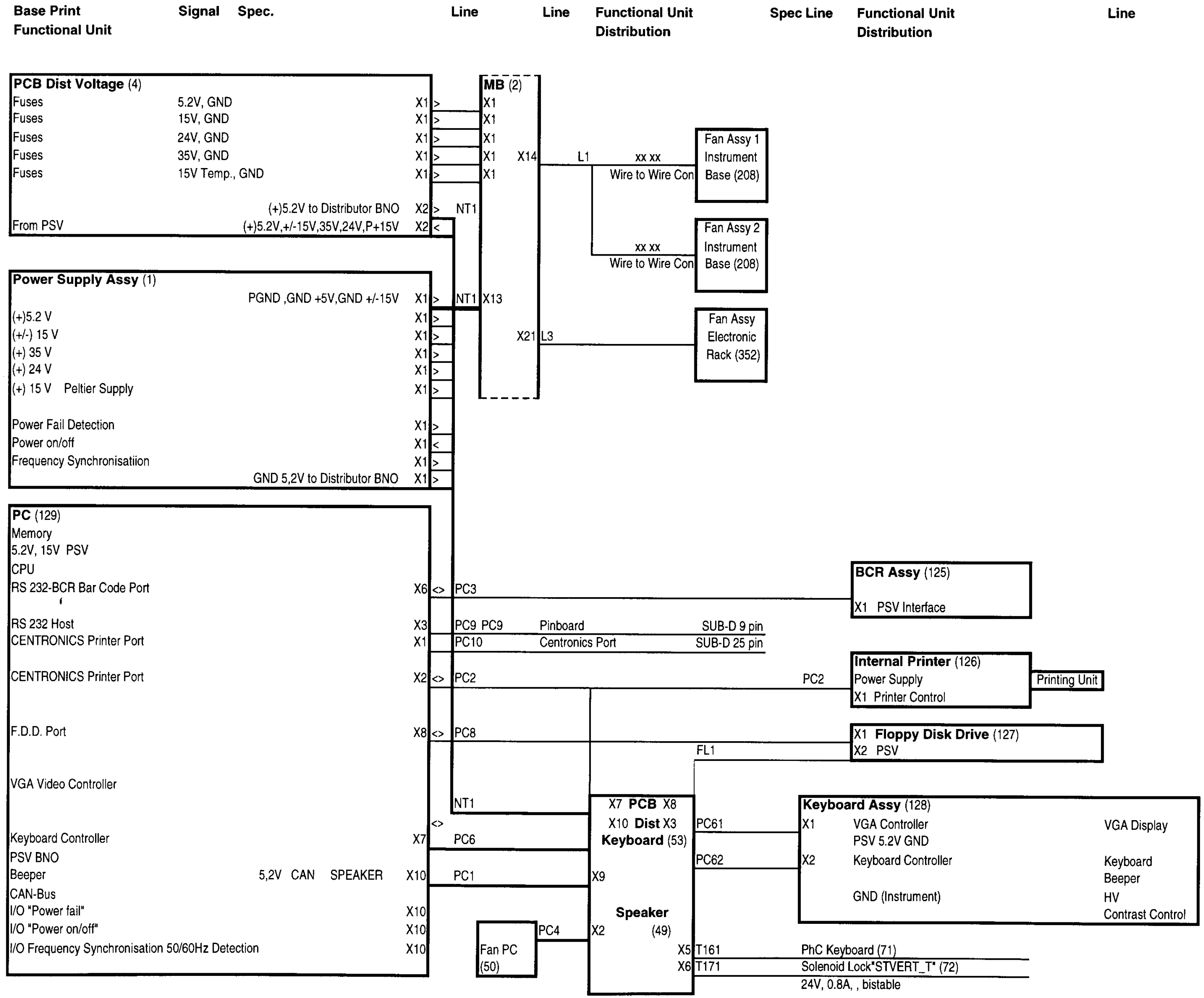
)


Base Print
Functional Unit
Signal
Line
Line
Functional Unit Distribution
Line
Functional Unit Distribution
Spec.
Functional Unit
PCB Rotor/Rotor Module BP4 (6)
Controller PCB 80196
CAN-Bus
5.2 V, 35 V, 24 V, (+/-) 15V PSV
S/R Control
SM1_R
LS5_R
LS6_R
LS7_R
Fan Rotation Sensor
VENT_R
Fan S/R Disc
VENT1_R
Rotor In Place Sensor
LS8_R
Control Incubator Rotor
SM2_R
LS1_R
LS2_R
LS3_R
LS4_R
Valve Wash Station 1
VAS1_R
Valve (VAB1) Bead Wash Drain
VAB1_R
Pump S/R Dilutor (PWD)
PWD_R
Waste Pump
PW_R
Pump Sipper Wash
PWS_R
Valve VWD1 Wash S/R 1
VWD1_R
Valve VWD2 Wash S/R 2
VWD2_R
Valve VWB1Wash Bead Mixer
VWB1_R
Valve VWS1 Wash Sipper
VWS1_R
Valve VAD1 Drain S/R 1
VAD1_R
Valve VAD2 Drain S/R 2
VAD2_R
Cover switch 2
Interlock2
OUT-RESERVE
RES_R
MB (2)
X17 R1
X16 R2
X18 R3
PCB Dist Rotor/Rotor S/R (7)
PCB Dist Rotor/Rotor Incubator (8)
Voltage Supply
CAN-BUS
PCB Dist Fluid (408)
PCB Incubator Heater BP6 (41)
X9
R10 Cover Switch 2; Microswitch (355)
R11 SM S/R Drive (10)
R12 PhC S/R Drive Home (11)
R13 PhC S/R Drive Forward (12)
R14 PhC S/R Drive Reverse (13)
R16 Fan Assy S/R Drive with Sensor 24V DC (15)
R17 PhC S/R Tray Present (16)
R21 SM Incubator Drive (17)
R22 PhC Incubator Drive Home (18)
R23 PhC Incubator Drive Forward (19)
R24 PhC Incubator Drive Reverse (20)
R25 PhC Incubator Drive Position 1/2 Half of Disc (21)
R26 Fan Assy S/R Drive (Incubator) 24V DC (14)
R27
R31 Pump PWD 24V DC (23)
R32 xx xx Wire to Wire Con Waste Pump PW 24V DC (24)
R33 Pump PWS 24V DC (25)
R34 xx xx Wire to Wire Con Valve VAS1 24V (26)
R35 xx xx Wire to Wire Con Valve VM1 24V (114)
R36 Valve VAB1 24V (391)
Valve RES 24V
R38 Valve VWD1 24V (27)
R39 Valve VWD2 24V (28)
R310 Valve VWB1 24V (29)
R311 Valve VWS1 24V (30)
R312 xx xx Wire to Wire Con Valve VAD1 24V (115)
R313 Valve VAD2 24V (32)


Base Print
Functional Unit
Signal
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Functional Unit
PCB Dilutor Reagent BP5 (76)
Controller PCB 80196
Dilutor Syringe Control (DD)
Syringe Valve Control (VDD)"
Pump S/R Syringe Prime (PSD)"
MFA S/R Control
Crash Sensor
LLD Sensor Signal
LLD ON
LLD Reset
Bead Mixer
Crash Sensor Bead Mixer
5.2 V, 35 V, 24 V, (+/-) 15V PSV
Clot Detection
Out-Reserve
IN- RESERVE
Out-Reserve
Valve Pressure Sensor S/R Assy (D1)"
SM3_D
LS5_D
SM4_D
LS6_D
PSD_D
CAN-Bus
SM1_D
SM2_D
LS1_D
LS2_D
LS3_D
LS4_D
CSH_D
LLD_D
EIN_D
SET_D
BR_D
CSB_D
CLOT_D
RES_D
RESO_D
DV1_D
X4
X5
X6
X7
X9
X3
X8
D6
MB (2)
X7
X20
D61
D1
D3
D2
D4
D5
SM Dilutor (237)
LB Dilutor Home (423)
SM Dilutor Valve (231)
LB Dilutor Valve Home (211)
Pump Sample Dilutor (235)
PCB Dist MFA (385)
X1
Ribbon Cable X2
X3
X4
X5
X6
X7
X8
D611
D612
D613
D614
D615
D616
D617
SM MFA Up/Down (384)
SM MFA Rotation (383)
HS MFA Up/Down Home (405)
PhC MFA Rotation Home (247)
PhC MFA Rotation Forward (248)
PhC MFA Rotation Reverse (249)
PCB LLD S/R (78)
X2
X1
LLD "Set"
LLD "Sample"
LLD "On"
X3
X5
X4
D6171
D61711
D61713
D61714
X1
PCB Preamp
LLD S/R (79)
X2
X3
X4
Contact Needles (91)
Needle S/R (185)
Sipper Switch Crash Sensor (113)
Motor Assy Bead Mixer (93)
Sipper Switch Crash Sensor Bead Mixer (220)

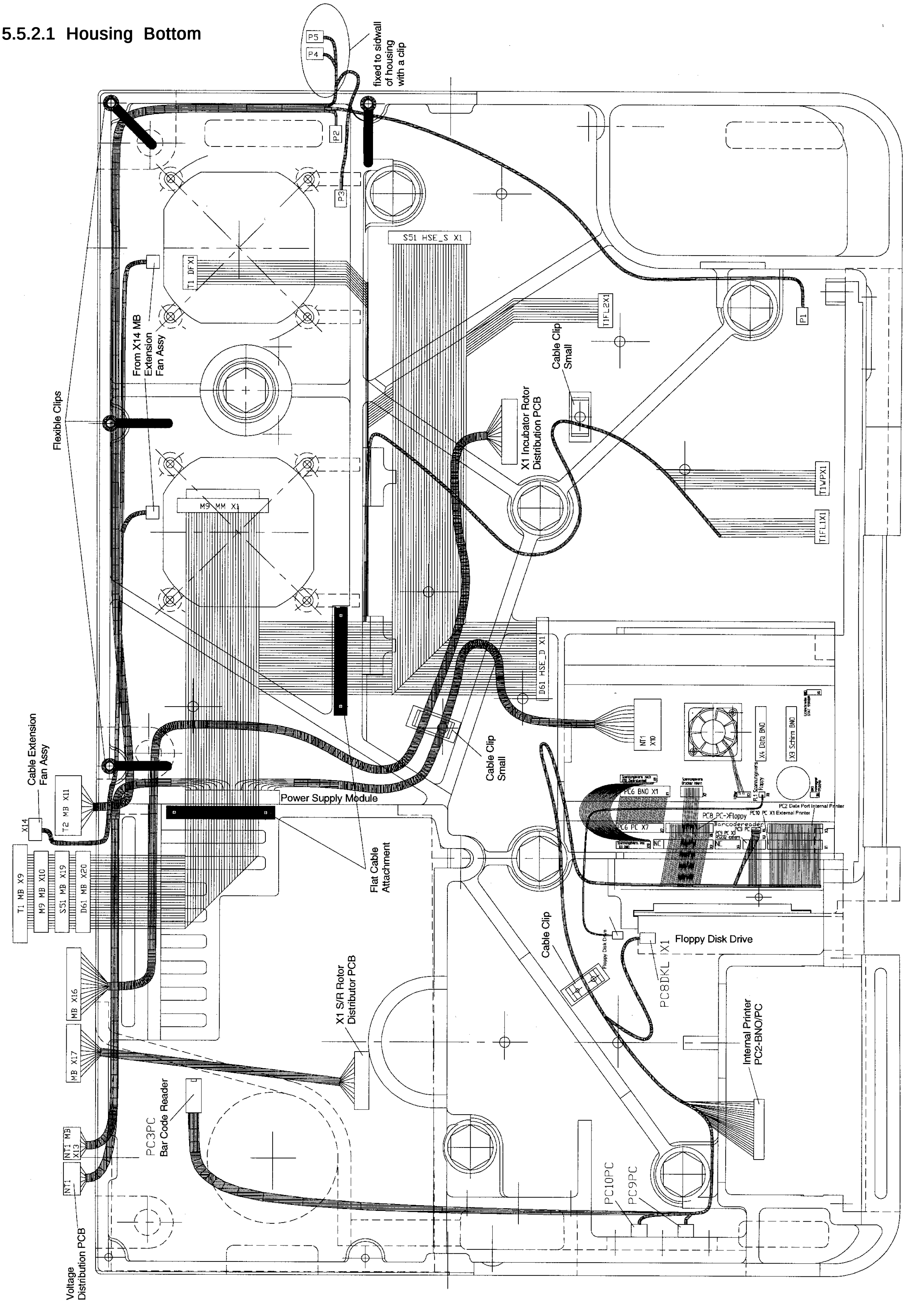

Base Print
Functional Unit
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Spec.
Functional Unit
PCB Rotor/Rotor Module BP4 (6)
MB (2)
PCB Dist Rotor/Rotor (8)
Power supply X8
CAN-BUS X8
R27
PCB Incubator Heater BP6 (41)
X9 Incubator Heater 12 bit, Lp4-11
35V, PWM X5,6,7,8
Assy. Cup Seg Sensors pull Up X1,2,3,4
CAN-Bus
R271(4) NTC Sensor x4 (48)
R272(4) Heater Resistors x4 (43)
R273(4) PhC Incubator Segment x4 (44)


Base Print
Functional Unit
Signal
Spec.
Line
Line
Functional Unit
Distribution
Line
Functional Unit
Distribution
Functional Unit
PCB Clot Detection Module BP7 (73)
Pressure Converter
X3
Controller 8051
Pressure Converter
X2
<
CAN-Bus/
X1
<>
5.2 V, (+/-) 15 V PSV
Clot Detection
X1
C1
X6
MB (2)
Pressure Sensor Reserve
Pressure Sensor Assy (75)
PCB Temp Control BP3 (46)
PCBClot Detection Module BP7 (73)
Temp Control Out 2
P5_OUT_5
X2
>
PSV 5
+15VP_5
X2
<
Peltier Assy 5 IN Control
X2
<
X5
X5
X5
MB (2)
X11
T2
xx xx
Wire to Wire Con
Peltier Assy 5 Detection Module 12V, 3A (301)
1 Fan 5
(301)
24V, 0.5A


Base Print
Functional Unit
Signal
Spec.
Line
Line
Functional Unit
Distribution
Spec Line
Functional Unit
Distribution
Line
PCB Dist Voltage (4)
Fuses 5.2V, GND X1 >
Fuses 15V, GND X1 >
Fuses 24V, GND X1 >
Fuses 35V, GND X1 >
Fuses 15V Temp., GND X1 >
(+)5.2V to Distributor BNO X2 >
From PSV (+)5.2V,+/-15V,35V,24V,P+15V X2 <
NT1
MB (2)
X1
X1
X1
X1
X1
X14
X13
X21
L1
L3
xx xx
Wire to Wire Con
Fan Assy 1
Instrument
Base (208)
Fan Assy 2
Instrument
Base (208)
Fan Assy
Electronic
Rack (352)
Power Supply Assy (1)
PGND ,GND +5V,GND +/-15V X1 >
(+)5.2 V X1 >
(+/-) 15 V X1 >
(+) 35 V X1 >
(+) 24 V X1 >
(+) 15 V Peltier Supply X1 >
Power Fail Detection X1 >
Power on/off X1 <
Frequency Synchronisatiion X1 >
GND 5,2V to Distributor BNO X1 >
NT1
PC (129)
Memory
5.2V, 15V PSV
CPU
RS 232-BCR Bar Code Port X6 <> PC3
RS 232 Host X3 PC9 PC9 Pinboard SUB-D 9 pin
CENTRONICS Printer Port X1 PC10 Centronics Port SUB-D 25 pin
CENTRONICS Printer Port X2 <> PC2
F.D.D. Port X8 <> PC8
VGA Video Controller
NT1
Keyboard Controller X7 <> PC6
PSV BNO
Beeper 5,2V CAN SPEAKER X10 PC1
CAN-Bus
I/O "Power fail" X10
I/O "Power on/off" X10
I/O Frequency Synchronisation 50/60Hz Detection X10
BCR Assy (125)
X1 PSV Interface
PC2
Internal Printer (126)
Power Supply
X1 Printer Control
Printing Unit
FL1
X1 Floppy Disk Drive (127)
X2 PSV
X7 PCB X8
X10 Dist X3
Keyboard (53)
X9
Speaker
X2 (49)
X5 T161
X6 T171
PC61
PC62
PC4
Fan PC
(50)
Keyboard Assy (128)
X1 VGA Controller
PSV 5.2V GND
X2 Keyboard Controller
GND (Instrument)
VGA Display
Keyboard
Beeper
HV
Contrast Control
PhC Keyboard (71)
Solenoid Lock"STVERT_T" (72)
24V, 0.8A, , bistable

5.5.2 Cable Locations

5.5.2.1 Housing Bottom


P5
P4
fixed to sidwall of housing with a clip
P2
P3
S51 HSE_S X1
T1 DF X1
T1FL2X1
P1
Cable Clip Small
From X14 MB Extension Fan Assy
X1 Incubator Rotor Distribution PCB
Flexible Clips
M9 MM X1
T1WPX1
T1FL1X1
D61 HSE_D X1
NT1 X10
X4 Data BNO
X3 Schirm BNO
Cable Clip Small
Cable Extension Fan Assy
X14
T2 MB X11
Power Supply Module
PCG BNO X1
PC8 PC->Floppy
PC6 PC X7
Barcodereader
PC2 Data Port Internal Printer
PC10 PC X1 External Printer
T1 MB X9
M9 MB X10
S51 MB X19
D61 MB X20
Flat Cable Attachment
Cable Clip
Floppy Disk Drive
Floppy Disk Drive
PC8DKL X1
MB X16
X1 S/R Rotor Distributor PCB
MB X17
Internal Printer PC2-BNO/PC
PC3PC Bar Code Reader
NT1 MB X13
NT1
PC10PC
PC9PC
Voltage Distribution PCB

5.5.2.2 Mounting Plate

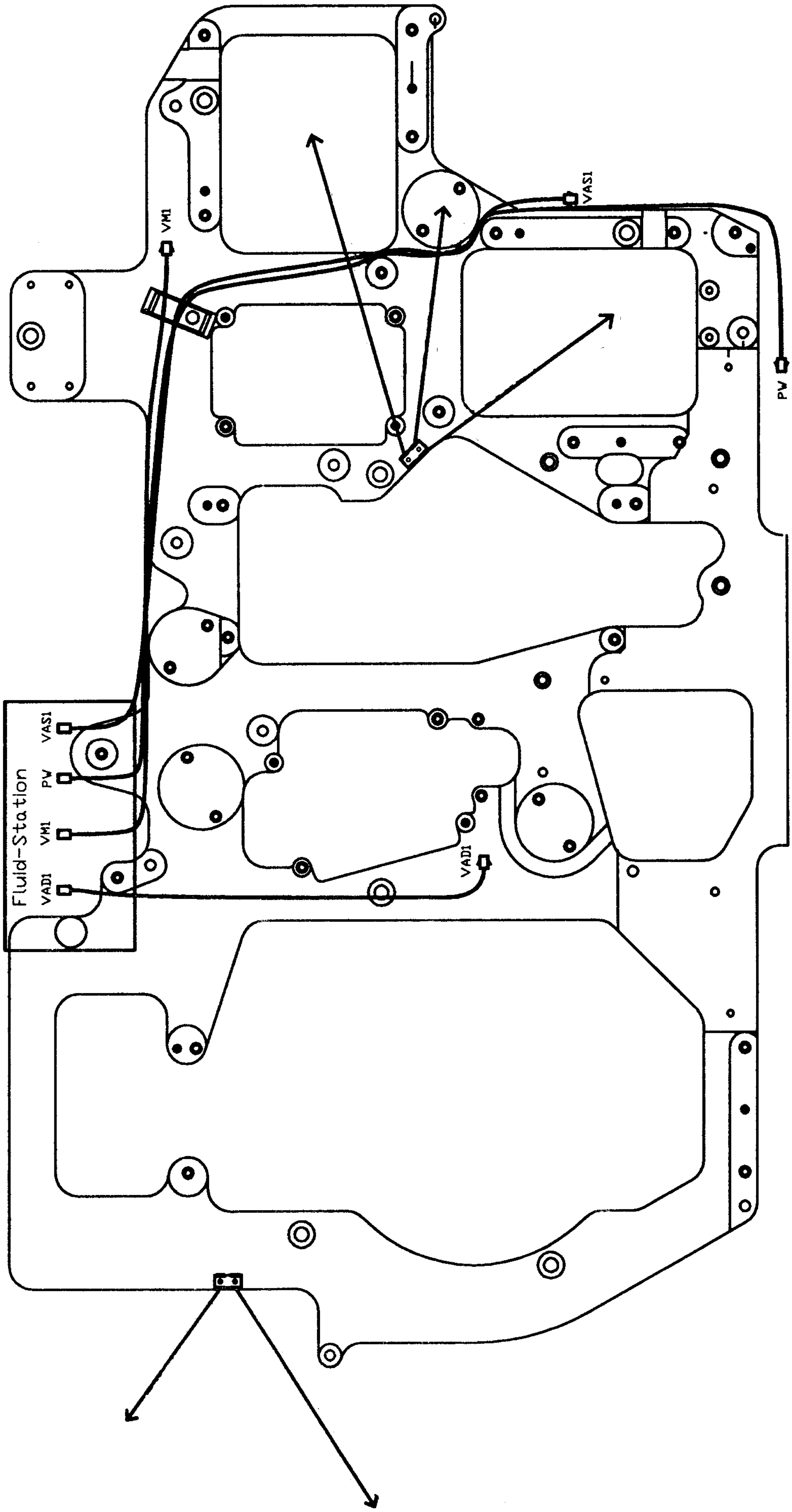
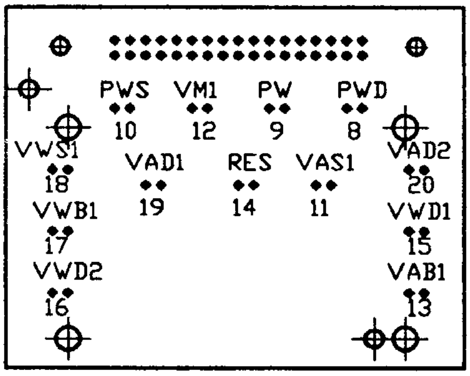

VM1
VAS1
PV
Fluid-Station
VAS1
PV
VM1
VAD1
VAD1

Fig.: Mont

5.5.2.3 Fluid Station

ITEM	DESCRIPTION	LOCATION
8	PWD	MAIN WASH PUMP
9	PW	WASTE PUMP
10	PWS	SIPPER (BLACK) WASH PUMP
11	VAS1	SIPPER (BLACK) WASH STATION DRAIN VALVE
12	VM1	MEASUREMENT MODULE 3-WAY VALVE
13	VAB1	RED WASH STATION 3-WAY DRAIN VALVE
14	RES	RESERVED
15	VWD1	BLUE WASH STATION DI SUPPLY
16	VWD2	GREEN WASH STATION DI SUPPLY
17	VWB1	RED WASH STATION DI SUPPLY
18	VWS1	BLACK WASH STATION DI SUPPLY
19	VAD1	BLUE STATION 3-WAY PINCH VALVE
20	VAD2	GREN WASH STN 3-WAY DRAIN VALVE


PWS
VM1
PW
PWD
10
12
9
8
VWS1
VAD1
RES
VAS1
VAD2
18
19
14
11
20
VWB1
VWD1
17
15
VWD2
VAB1
16
13

RED = BEAD WASH STATION
GREEN = S/R WASH (BACK) STATION
BLACK = SIPPER (MEASUREMENT) WASH STATION
BLUE = S/R WASH (FRONT) STATION

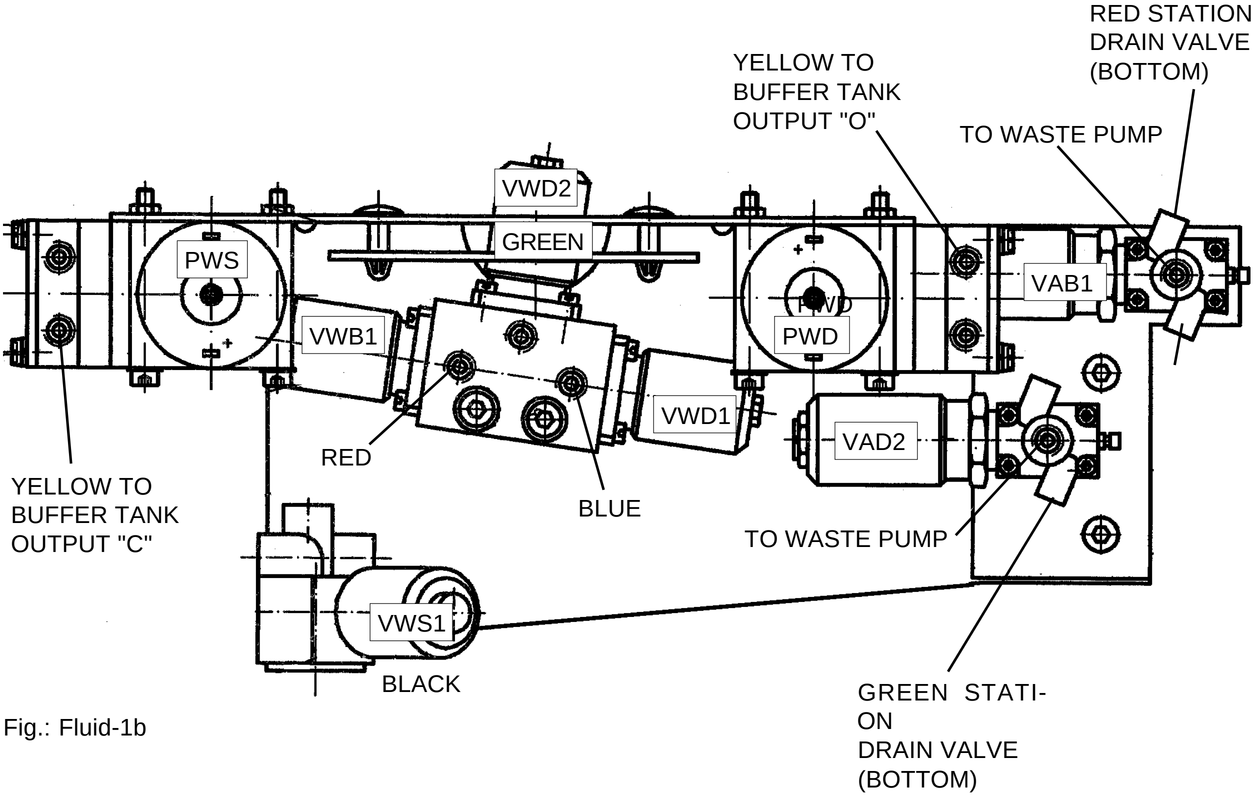

RED STATION DRAIN VALVE (BOTTOM)
YELLOW TO BUFFER TANK OUTPUT "O"
TO WASTE PUMP
VWD2
GREEN
PWS
VAB1
PWD
VWB1
VWD1
VAD2
RED
BLUE
YELLOW TO BUFFER TANK OUTPUT "C"
TO WASTE PUMP
VWS1
BLACK
GREEN STATION DRAIN VALVE (BOTTOM)

Fig.: Fluid-1b

5.5.2.4 OEM Master

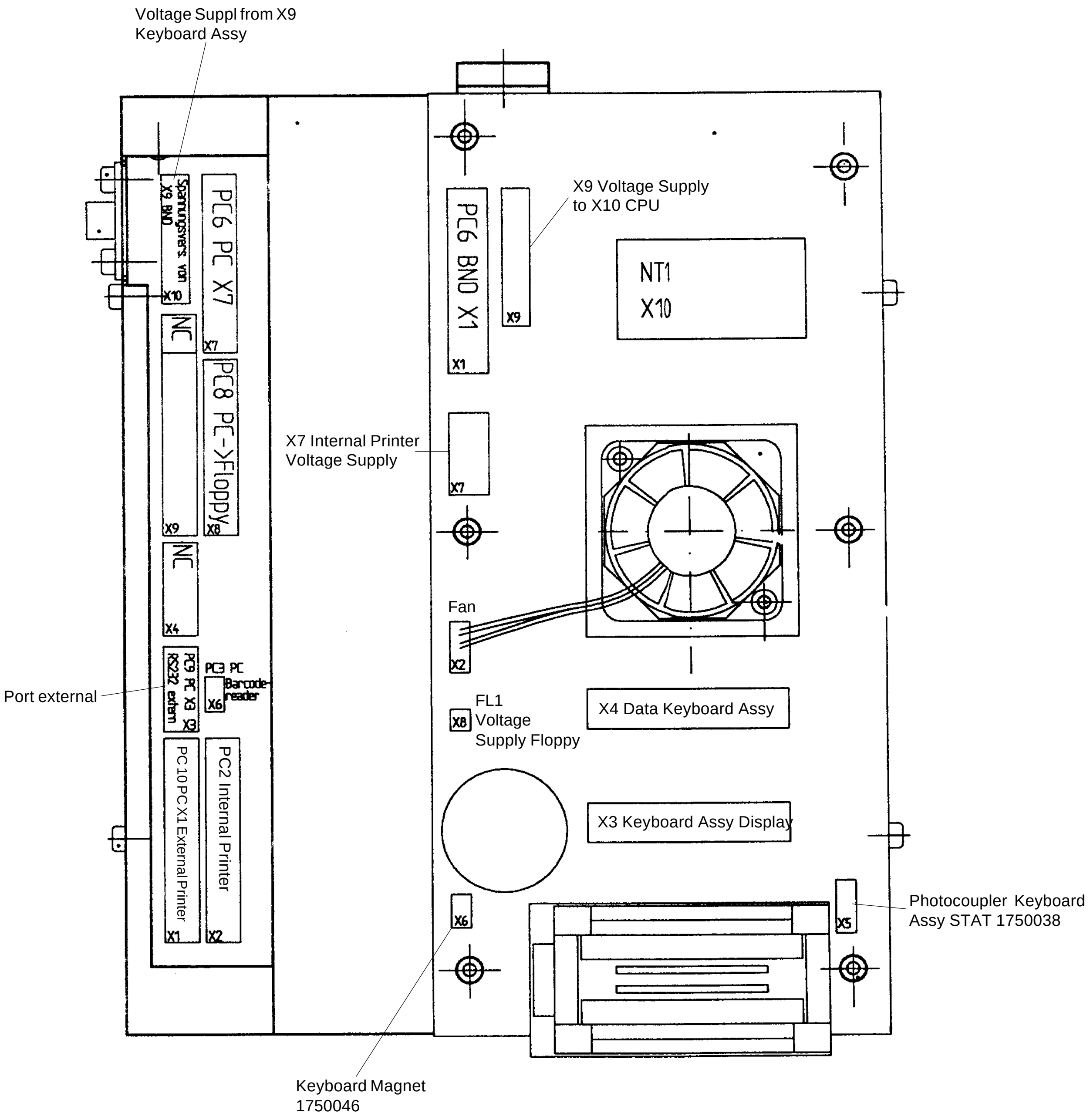

Voltage Suppl from X9
Keyboard Assy
Spannungsvers. von
X9 BNO
X10
PC6 PC X7
X7
NC
X9
PC8 PC->Floppy
X8
NC
X4
PC9 PC X3
RS232 extern
X3
PC3 PC
Barcode-
reader
X6
Port external
PC 10 PC X1 External Printer
X1
PC2 Internal Printer
X2
PC6 BNO X1
X1
X9
X9 Voltage Supply
to X10 CPU
NT1
X10
X7 Internal Printer
Voltage Supply
X7
Fan
X2
FL1
X8
Voltage
Supply Floppy
X4 Data Keyboard Assy
X3 Keyboard Assy Display
X6
X5
Photocoupler Keyboard
Assy STAT 1750038
Keyboard Magnet
1750046

Fig.: OEM-1

5.5.2.5 Incubator

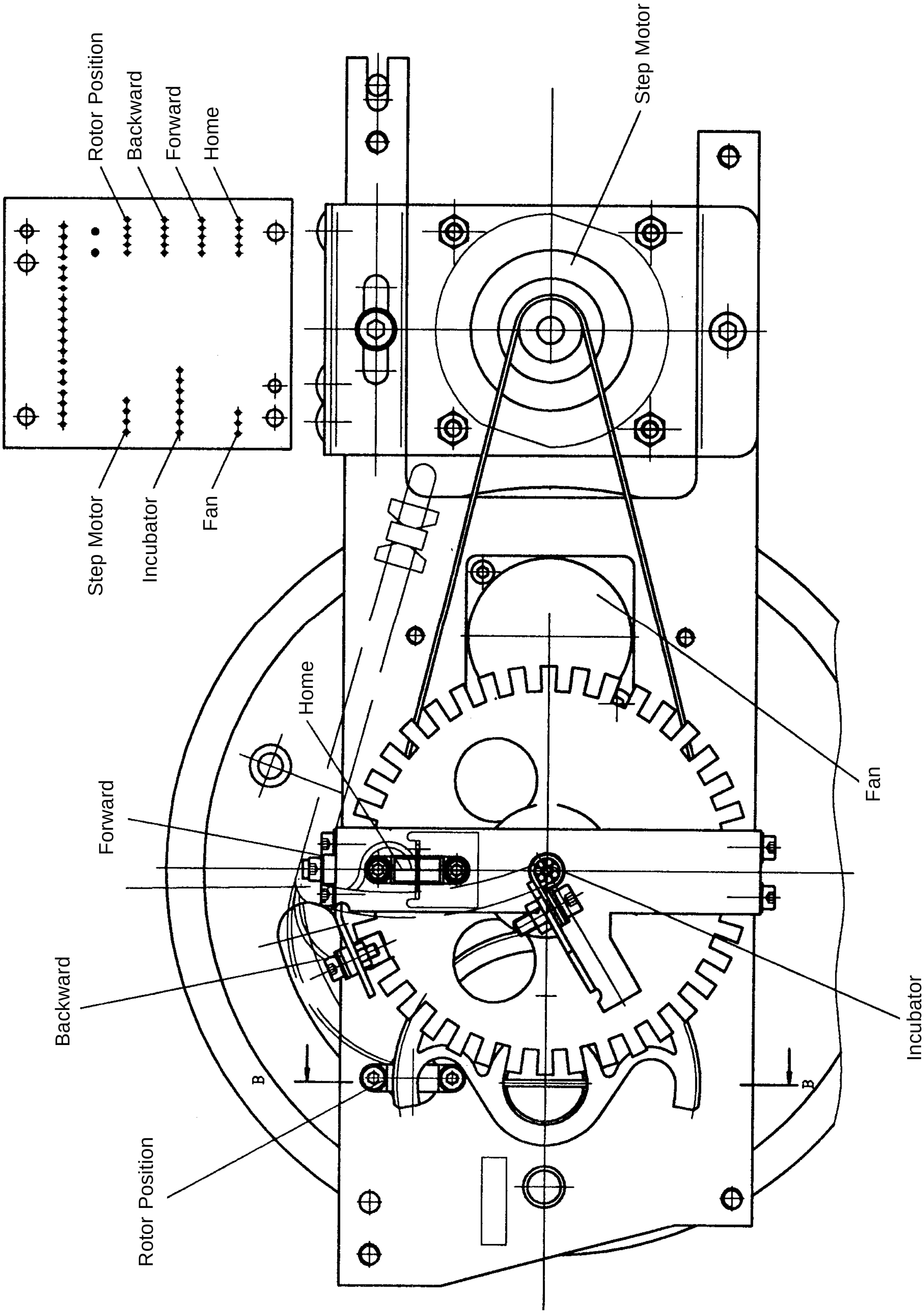

Rotor Position
Backward
Forward
Home
Step Motor
Incubator
Fan
Step Motor
Fan
Home
Forward
Backward
Incubator
Rotor Position
B
B

Fig.: Ink-3

5.5.2.6 Sample Rotor

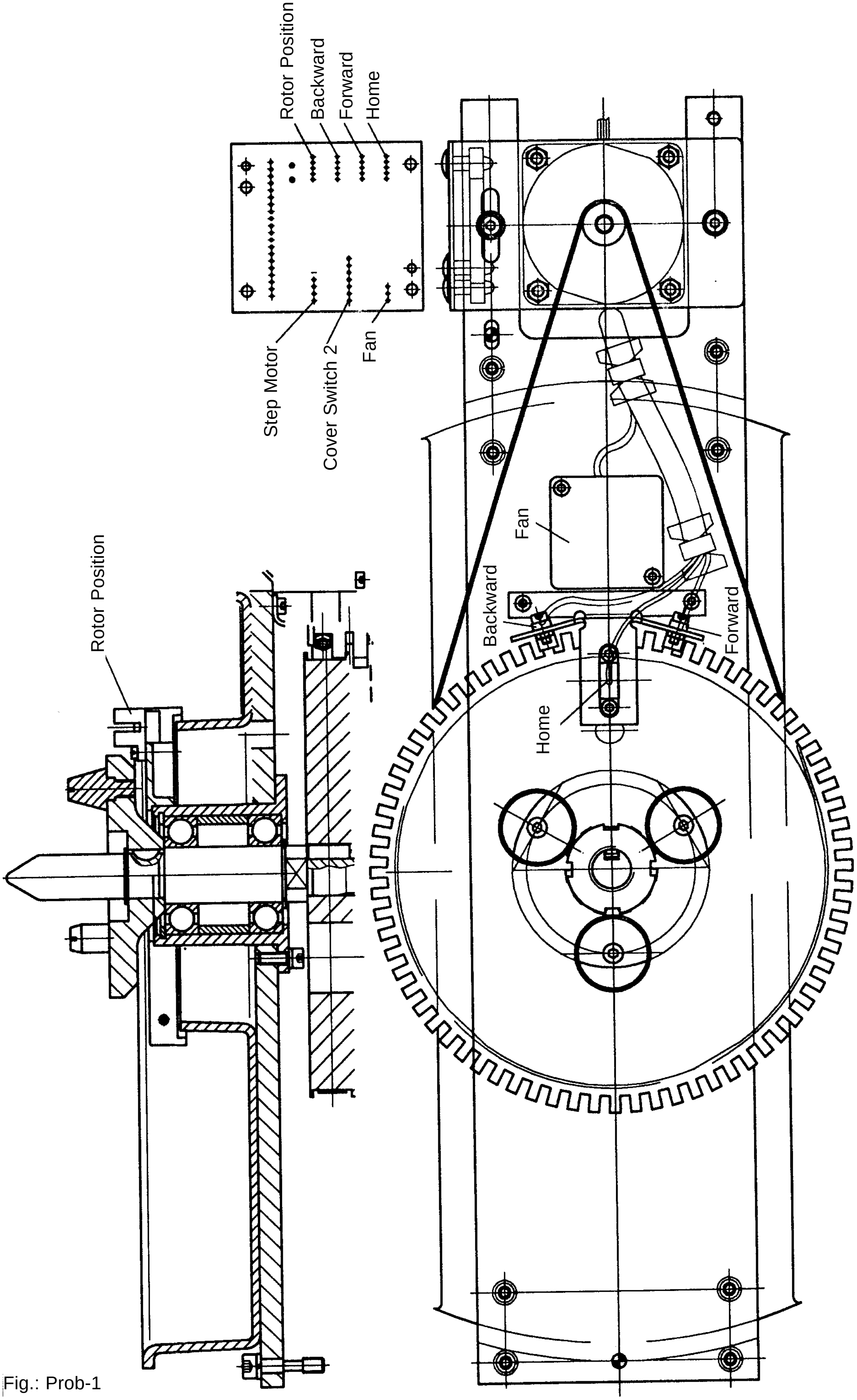

Rotor Position
Backward
Forward
Home
Step Motor
Cover Switch 2
Fan
Fan
Backward
Forward
Home
Rotor Position

Fig.: Prob-1

5.5.2.7 List of Cables

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
1		Cable M1							
2	M1	Base Print 1 Detection	X1	1	(+)6V	Flat	Preamplifier	X1	1
3	M1	Base Print 1 Detection	X1	2	GND	Flat	Preamplifier	X1	2
4	M1	Base Print 1 Detection	X1	3	GND	Flat	Preamplifier	X1	3
5	M1	Base Print 1 Detection	X1	4	(-)6V	Flat	Preamplifier	X1	4
6		Cable M2							
7	M2	Base Print 1 Detection	X2		Signal	Coaxial	Preamplifier	X3	Seele
8	M2	Base Print 1 Detection	X2		GND	Coaxial	Preamplifier	X3	Sch.
9		Cable M4							
10	M4	Base Print 1 Detection	X4	1	(+)15V	Flat	High Voltage	X1	1
11	M4	Base Print 1 Detection	X4	2,3,4	GND	Flat	High Voltage	X1	2,3,4
12	M4	Base Print 1 Detection	X4	5	ON/OFF	Flat	High Voltage	X1	5
13	M4	Base Print 1 Detection	X4	6,8	GND	Flat	High Voltage	X1	6,8
14	M4	Base Print 1 Detection	X4	7	Signal (VC)	Flat	High Voltage	X1	7
15	M4	Base Print 1 Detection	X4	9	Signal (MONIT.)	Flat	High Voltage	X1	9
16	M4	Base Print 1 Detection	X4	10	M_GND	Flat	High Voltage	X1	10
17		Cable M41 (fixed to PMT)							
18	M41	High Voltage	X2	1	(-)HV	Teflon Litz	PMT	-	
19	M41	High Voltage	X2	2	GND	Teflon Litz	PMT	-	
20	M41	High Voltage	X2	3	Signal (DYN.)	Teflon Litz	PMT	-	
21	M41	High Voltage	X2	4	Signal (DYN.)	Teflon Litz	PMT	-	
22		Cable M5							
23	M5	Potentiostat	X11	1	Referenzel.	Coaxial	Cell	-	
24	M5	Potentiostat	X11	2	GND	Coaxial	Cell	-	
25	M5	Potentiostat	X11	3	Arbeitsel.	Teflon Litz	Cell	-	
26	M5	Potentiostat	X11	4	Gegenel.	Teflon Litz	Cell	-	
27		Cable M6 (fixed to DC Motor)							
28	M6	Potentiostat	X101	1	DC-MOT +	Teflon Litz	DC Magnet Drive	-	
29	M6	Potentiostat	X101	2	DC-MOT -	Teflon Litz	DC Magnet Drive	-	
30		Cable M7 (fixed to Photo Coupler)						-	
31	M7	Potentiostat	X103	1	LED Anode	Litz Wire	Photo Coupler Home	-	red
32	M7	Potentiostat	X103	2	LED Kath.	Litz Wire	Photo Coupler Home	-	black
33	M7	Potentiostat	X103	3	VCC	Litz Wire	Photo Coupler Home	-	white
34	M7	Potentiostat	X103	4	OUT	Litz Wire	Photo Coupler Home	-	blue
35	M7	Potentiostat	X103	5	GND	Litz Wire	Photo Coupler Home	-	green
36		Cable M8 (fixed to Photo Coupler)						-	
37	M8	Potentiostat	X102	1	LED Anode	Litz Wire	Photo Coupler Cell	-	red
38	M8	Potentiostat	X102	2	LED Kath.	Litz Wire	Photo Coupler Cell	-	black
39	M8	Potentiostat	X102	3	VCC	Litz Wire	Photo Coupler Cell	-	white
40	M8	Potentiostat	X102	4	OUT	Litz Wire	Photo Coupler Cell	-	blue

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
41	M8	Potentiostat	X102	5	GND	Litz Wire	Photo Coupler Cell	-	green
42		Cable M9							
43	M9	MB	X10	17	CAN_HIGH_IN	Flat	Detection Module Input	X1	9
44	M9	MB	X10	16	CAN_LOW_IN	Flat	Detection Module Input	X1	21
45	M9	MB	X10	15	CAN_HIGH_OUT	Flat	Detection Module Input	X1	8
46	M9	MB	X10	14	CAN_LOW_OUT	Flat	Detection Module Input	X1	20
47	M9	MB	X10	13	-	Flat	Detection Module Input	X1	7
48	M9	MB	X10	12	-	Flat	Detection Module Input	X1	19
49	M9	MB	X10	22	(+) 15V	Flat	Detection Module Input	X1	24
50	M9	MB	X10	21	(-)15V	Flat	Detection Module Input	X1	11
51	M9	MB	X10	20	GND	Flat	Detection Module Input	X1	23
52	M9	MB	X10	24	GND	Flat	Detection Module Input	X1	25
53	M9	MB	X10	25	5V	Flat	Detection Module Input	X1	13
54	M9	MB	X10	11	-	Flat	Detection Module Input	X1	6
55	M9	MB	X10	23	D_GND	Flat	Detection Module Input	X1	12
56	M9	MB	X10	18	(+) 24V	Flat	Detection Module Input	X1	22
57	M9	MB	X10	19	P_GND	Flat	Detection Module Input	X1	10
58	M9	MB	X10	10	EECS_4~	Flat	Detection Module Input	X1	18
59	M9	MB	X10	9	ACS_4~	Flat	Detection Module Input	X1	5
60	M9	MB	X10	8	ADIN	Flat	Detection Module Input	X1	17
61	M9	MB	X10	7	ADOUT	Flat	Detection Module Input	X1	4
62	M9	MB	X10	6	ASCLK	Flat	Detection Module Input	X1	16
63	M9	MB	X10	5	AEOC_4	Flat	Detection Module Input	X1	3
64	M9	MB	X10	4	GND_15V	Flat	Detection Module Input	X1	15
65	M9	MB	X10	3	(+)15V	Flat	Detection Module Input	X1	2
66	M9	MB	X10	2	(-)15V	Flat	Detection Module Input	X1	14
67	M9	MB	X10	1	GND_15V	Flat	Detection Module Input	X1	1
68		Cable M10							
69	M10	Detection Module Input	X2	9	CAN_HIGH_IN	Flat	Dist Detection Module	X1	10
70	M10	Detection Module Input	X2	21	CAN_LOW_IN	Flat	Dist Detection Module	X1	11
71	M10	Detection Module Input	X2	8	CAN_HIGH_OUT	Flat	Dist Detection Module	X1	12
72	M10	Detection Module Input	X2	20	CAN_LOW_OUT	Flat	Dist Detection Module	X1	13
73	M10	Detection Module Input	X2	7	-	Flat	Dist Detection Module	X1	14
74	M10	Detection Module Input	X2	19	-	Flat	Dist Detection Module	X1	15
75	M10	Detection Module Input	X2	24	(+) 15V	Flat	Dist Detection Module	X1	5
76	M10	Detection Module Input	X2	11	(-)15V	Flat	Dist Detection Module	X1	6
77	M10	Detection Module Input	X2	23	GND	Flat	Dist Detection Module	X1	7
78	M10	Detection Module Input	X2	25	GND	Flat	Dist Detection Module	X1	3
79	M10	Detection Module Input	X2	13	5V	Flat	Dist Detection Module	X1	2
80	M10	Detection Module Input	X2	6	-	Flat	Dist Detection Module	X1	16

	Wire	**From**	**Plug**	**Pin**	**Signal Name**	**Cable Type**	**To**	**Plug**	**Pin**
81	M10	Detection Module Input	X2	12	D_GND	Flat	Dist Detection Module	X1	4
82	M10	Detection Module Input	X2	22	(+) 24V	Flat	Dist Detection Module	X1	9
83	M10	Detection Module Input	X2	10	P_GND	Flat	Dist Detection Module	X1	8
84	M10	Detection Module Input	X2	18	EECS_4~	Flat	Preamp Temp Det Mod	X1	1
85	M10	Detection Module Input	X2	5	ACS_4~	Flat	Preamp Temp Det Mod	X1	2
86	M10	Detection Module Input	X2	17	ADIN	Flat	Preamp Temp Det Mod	X1	3
87	M10	Detection Module Input	X2	4	ADOUT	Flat	Preamp Temp Det Mod	X1	4
88	M10	Detection Module Input	X2	16	ASCLK	Flat	Preamp Temp Det Mod	X1	5
89	M10	Detection Module Input	X2	3	AEOC_4	Flat	Preamp Temp Det Mod	X1	6
90	M10	Detection Module Input	X2	15	AGND	Flat	Preamp Temp Det Mod	X1	7
91	M10	Detection Module Input	X2	2	(+)15V	Flat	Preamp Temp Det Mod	X1	8
92	M10	Detection Module Input	X2	14	(-)15V	Flat	Preamp Temp Det Mod	X1	9
93	M10	Detection Module Input	X2	1	AGND	Flat	Preamp Temp Det Mod	X1	10
94									
95	M101	Preamp Temp Det Mod	X2		Fühl1	Litz Wire	Sensor	-	
96	M101	Preamp Temp Det Mod	X2		Fühl2	Litz Wire	Sensor	-	
97		Hamilton							
98	S1	Base Print 2 "Sipper"	X4	1	PHA+		SM Dilutor	-	
99	S1	Base Print 2 "Sipper"	X4	2	PHA_M		SM Dilutor	-	
100	S1	Base Print 2 "Sipper"	X4	3	PHA-		SM Dilutor	-	
101	S1	Base Print 2 "Sipper"	X4	4	PHB+		SM Dilutor	-	
102	S1	Base Print 2 "Sipper"	X4	5	PHB_M		SM Dilutor	-	
103	S1	Base Print 2 "Sipper"	X4	6	PHB-		SM Dilutor	-	
104		Hamilton							
105	S2	Base Print 2 "Sipper"	X5	1	LS_A		PhCoupler Dilutor Home	-	
106	S2	Base Print 2 "Sipper"	X5	2	LS_K		PhCoupler Dilutor Home	-	
107	S2	Base Print 2 "Sipper"	X5	3	LS_C		PhCoupler Dilutor Home	-	
108	S2	Base Print 2 "Sipper"	X5	4	LS_E		PhCoupler Dilutor Home	-	
109		Hamilton							
110	S3	Base Print 2 "Sipper"	X6	1	PHA+		SM Valve	-	
111	S3	Base Print 2 "Sipper"	X6	2	PHA-		SM Valve	-	
112	S3	Base Print 2 "Sipper"	X6	3	PHB+		SM Valve	-	
113	S3	Base Print 2 "Sipper"	X6	4	N.C.		SM Valve	-	
114	S3	Base Print 2 "Sipper"	X6	5	PHB-		SM Valve	-	
115		Hamilton							
116	S4	Base Print 2 "Sipper"	X7	1	LS_A		PhCoupler Valve Home	-	
117	S4	Base Print 2 "Sipper"	X7	2	LS_K		PhCoupler Valve Home	-	
118	S4	Base Print 2 "Sipper"	X7	3	LS_C		PhCoupler Valve Home	-	
119	S4	Base Print 2 "Sipper"	X7	4	LS_E		PhCoupler Valve Home	-	
120		Cable Assy S5							

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
121	S5	MB	X8	1	CAN_HIGH_IN	Flat	Base Print 2	X3	1
122	S5	MB	X8	2	CAN_LOW_IN	Flat	Base Print 2	X3	2
123	S5	MB	X8	3	CAN_HIGH_OUT	Flat	Base Print 2	X3	3
124	S5	MB	X8	4	CAN_LOW_OUT	Flat	Base Print 2	X3	4
125	S5	MB	X8	5	-	Flat	Base Print 2	X3	5
126	S5	MB	X8	6	-	Flat	Base Print 2	X3	6
127	S5	MB	X8	7	VM1_S	Flat	Base Print 2	X3	7
128	S5	MB	X8	8	VAB1_S(VM2_S)	Flat	Base Print 2	X3	8
129	S5	MB	X8	9	(+) 24V	Flat	Base Print 2	X3	9
130	S5	MB	X8	10	(+) 24V	Flat	Base Print 2	X3	10
131	S5	MB	X8	11	GND_5V_SEN	Flat	Base Print 2	X3	11
132	S5	MB	X8	12	GND_5V_SEN	Flat	Base Print 2	X3	12
133	S5	MB	X8	13	(+)5V_SEN	Flat	Base Print 2	X3	13
134	S5	MB	X8	14	(+)5V_SEN	Flat	Base Print 2	X3	14
135	S5	MB	X8	15	LS1_S	Flat	Base Print 2	X3	15
136	S5	MB	X8	16	LS2_S	Flat	Base Print 2	X3	16
137	S5	MB	X8	17	LS3_S	Flat	Base Print 2	X3	17
138	S5	MB	X8	18	LS4_S	Flat	Base Print 2	X3	18
139	S5	MB	X8	19	(+)15V_LLD	Flat	Base Print 2	X3	19
140	S5	MB	X8	20	GND_SEN_LLD	Flat	Base Print 2	X3	20
141	S5	MB	X8	21	(-)15V_LLD	Flat	Base Print 2	X3	21
142	S5	MB	X8	22	EIN_S	Flat	Base Print 2	X3	22
143	S5	MB	X8	23	LLD_S	Flat	Base Print 2	X3	23
144	S5	MB	X8	24	SET_S	Flat	Base Print 2	X3	24
145	S5	MB	X8	25	CRH_S	Flat	Base Print 2	X3	25
146	S5	MB	X8	26	-	Flat	Base Print 2	X3	26
147	S5	MB	X8	27	SM2_S PHA+	Flat	Base Print 2	X3	27
148	S5	MB	X8	28	SM2_S PHA-	Flat	Base Print 2	X3	28
149	S5	MB	X8	29	SM2_S PHB+	Flat	Base Print 2	X3	29
150	S5	MB	X8	30	SM2_S PHB-	Flat	Base Print 2	X3	30
151	S5	MB	X8	31	SM1_S PHA+	Flat	Base Print 2	X3	31
152	S5	MB	X8	32	SM1_S PHA-	Flat	Base Print 2	X3	32
153	S5	MB	X8	33	SM1_S PHB+	Flat	Base Print 2	X3	33
154	S5	MB	X8	34	SM1_S PHB-	Flat	Base Print 2	X3	34
155	S5	MB	X8	35	RES_OUT_S	Flat	Base Print 2	X3	35
156	S5	MB	X8	36	RES_IN_S	Flat	Base Print 2	X3	36
157	S5	MB	X8	37	GND_35V	Flat	Base Print 2	X3	37
158	S5	MB	X8	38	GND_35V	Flat	Base Print 2	X3	38
159	S5	MB	X8	39	GND_35V	Flat	Base Print 2	X3	39
160	S5	MB	X8	40	GND_35V	Flat	Base Print 2	X3	40

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
161	S5	MB	X8	41	GND_35V	Flat	Base Print 2	X3	41
162	S5	MB	X8	42	(+)35V	Flat	Base Print 2	X3	42
163	S5	MB	X8	43	(+)35V	Flat	Base Print 2	X3	43
164	S5	MB	X8	44	(+)35V	Flat	Base Print 2	X3	44
165	S5	MB	X8	45	GND_24V	Flat	Base Print 2	X3	45
166	S5	MB	X8	46	GND_24V	Flat	Base Print 2	X3	46
167	S5	MB	X8	47	GND_24V	Flat	Base Print 2	X3	47
168	S5	MB	X8	48	(+)24V	Flat	Base Print 2	X3	48
169	S5	MB	X8	49	(+)24V	Flat	Base Print 2	X3	49
170	S5	MB	X8	50	GND_15V	Flat	Base Print 2	X3	50
171	S5	MB	X8	51	GND_15V	Flat	Base Print 2	X3	51
172	S5	MB	X8	52	(-)15V	Flat	Base Print 2	X3	52
173	S5	MB	X8	53	(+)15V	Flat	Base Print 2	X3	53
174	S5	MB	X8	54	GND_5V	Flat	Base Print 2	X3	54
175	S5	MB	X8	55	GND_5V	Flat	Base Print 2	X3	55
176	S5	MB	X8	56	(+)5V	Flat	Base Print 2	X3	56
177	S5	MB	X8	57	GND_5V	Flat	Base Print 2	X3	57
178	S5	MB	X8	58	(+)5V	Flat	Base Print 2	X3	58
179	S5	MB	X8	59	GND_5V	Flat	Base Print 2	X3	59
180	S5	MB	X8	60	(+)5V	Flat	Base Print 2	X3	60
181		Cable S51							
182	S51	MB	X19	1	SM1_S PHA+	Flat	Dist MFA Sipper	X1	1
183	S51	MB	X19	2	SM1_S PHA+	Flat	Dist MFA Sipper	X1	2
184	S51	MB	X19	3	SM1_S PHA-	Flat	Dist MFA Sipper	X1	3
185	S51	MB	X19	4	SM1_S PHA-	Flat	Dist MFA Sipper	X1	4
186	S51	MB	X19	5	SM1_S PHB+	Flat	Dist MFA Sipper	X1	5
187	S51	MB	X19	6	SM1_S PHB+	Flat	Dist MFA Sipper	X1	6
188	S51	MB	X19	7	SM1_S PHB-	Flat	Dist MFA Sipper	X1	7
189	S51	MB	X19	8	SM1_S PHB-	Flat	Dist MFA Sipper	X1	8
190	S51	MB	X19	9	SM2_S PHA+	Flat	Dist MFA Sipper	X1	9
191	S51	MB	X19	10	SM2_S PHA+	Flat	Dist MFA Sipper	X1	10
192	S51	MB	X19	11	SM2_S PHA-	Flat	Dist MFA Sipper	X1	11
193	S51	MB	X19	12	SM2_S PHA-	Flat	Dist MFA Sipper	X1	12
194	S51	MB	X19	13	SM2_S PHB+	Flat	Dist MFA Sipper	X1	13
195	S51	MB	X19	14	SM2_S PHB+	Flat	Dist MFA Sipper	X1	14
196	S51	MB	X19	15	SM2_S PHB-	Flat	Dist MFA Sipper	X1	15
197	S51	MB	X19	16	SM2_S PHB-	Flat	Dist MFA Sipper	X1	16
198	S51	MB	X19	17	LS2_S	Flat	Dist MFA Sipper	X1	17
199	S51	MB	X19	18	LS3_S	Flat	Dist MFA Sipper	X1	18
200	S51	MB	X19	19	LS4_S	Flat	Dist MFA Sipper	X1	19

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
201	S51	MB	X19	20	GND_SEN_5V	Flat	Dist MFA Sipper	X1	20
202	S51	MB	X19	21	GND_SEN_5V	Flat	Dist MFA Sipper	X1	21
203	S51	MB	X19	22	(+)5V_SEN	Flat	Dist MFA Sipper	X1	22
204	S51	MB	X19	23	GND_SEN_5V	Flat	Dist MFA Sipper	X1	23
205	S51	MB	X19	24	LS1_S	Flat	Dist MFA Sipper	X1	24
206	S51	MB	X19	25	CSB_S	Flat	Dist MFA Sipper	X1	25
207	S51	MB	X19	26	(-)15V_LLD	Flat	Dist MFA Sipper	X1	26
208	S51	MB	X19	27	GND_SEN_LLD	Flat	Dist MFA Sipper	X1	27
209	S51	MB	X19	28	(+)15V_LLD	Flat	Dist MFA Sipper	X1	28
210	S51	MB	X19	29	Beadmotor-	Flat	Dist MFA Sipper	X1	29
211	S51	MB	X19	30	Beadmotor+	Flat	Dist MFA Sipper	X1	30
212	S51	MB	X19	31	SET_S	Flat	Dist MFA Sipper	X1	31
213	S51	MB	X19	32	EIN_S	Flat	Dist MFA Sipper	X1	32
214	S51	MB	X19	33	LLD_S	Flat	Dist MFA Sipper	X1	33
215	S51	MB	X19	34	CRH_S	Flat	Dist MFA Sipper	X1	34
216		Hamilton							
217	S511	Dist MFA Sipper	X3	1	SM1_S PHA+	Litz Wire	SM MFA Vert	-	
218	S511	Dist MFA Sipper	X3	2	SM1_S PHA_M	Litz Wire	SM MFA Vert	-	
219	S511	Dist MFA Sipper	X3	3	SM1_S PHA-	Litz Wire	SM MFA Vert	-	
220	S511	Dist MFA Sipper	X3	4	SM1_S PHB+	Litz Wire	SM MFA Vert	-	
221	S511	Dist MFA Sipper	X3	5	SM1_S PHB_M	Litz Wire	SM MFA Vert	-	
222	S511	Dist MFA Sipper	X3	6	SM1_S PHB-	Litz Wire	SM MFA Vert	-	
223		Hamilton							
224	S512	Dist MFA Sipper	X4	1	SM2_S PHA+	Litz Wire	SM MFA Rot	-	
225	S512	Dist MFA Sipper	X4	2	SM2_S PHA_M	Litz Wire	SM MFA Rot	-	
226	S512	Dist MFA Sipper	X4	3	SM2_S PHA-	Litz Wire	SM MFA Rot	-	
227	S512	Dist MFA Sipper	X4	4	NC		SM MFA Rot	-	
228	S512	Dist MFA Sipper	X4	5	SM2_S PHB+	Litz Wire	SM MFA Rot	-	
229	S512	Dist MFA Sipper	X4	6	SM2_S PAB_M	Litz Wire	SM MFA Rot	-	
230	S512	Dist MFA Sipper	X4	7	SM2_S PHB-	Litz Wire	SM MFA Rot	-	
231		Hamilton							
232	S513	Dist MFA Sipper	X5	1	(+) 5V	fixed	HS MFA Home Vert	-	
233	S513	Dist MFA Sipper	X5	2	GND	fixed	HS MFA Home Vert	-	
234	S513	Dist MFA Sipper	X5	3	OUT	fixed	HS MFA Home Vert	-	
235		Hamilton							
236	S514	Dist MFA Sipper	X6	1	LS_A	Litz Wire	PhCoup MFA Home Rot	-	
237	S514	Dist MFA Sipper	X6	2	LS_K	Litz Wire	PhCoup MFA Home Rot	-	
238	S514	Dist MFA Sipper	X6	3	LS_C	Litz Wire	PhCoup MFA Home Rot	-	
239	S514	Dist MFA Sipper	X6	4	LS_E	Litz Wire	PhCoup MFA Home Rot	-	
240		Hamilton							

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
241	S515	Dist MFA Sipper	X7	1	LS_A	Litz Wire	PhCoupl MFA Rot Forw	-	
242	S515	Dist MFA Sipper	X7	2	LS_K	Litz Wire	PhCoupl MFA Rot Forw	-	
243	S515	Dist MFA Sipper	X7	3	LS_C	Litz Wire	PhCoupl MFA Rot Forw	-	
244	S515	Dist MFA Sipper	X7	4	LS_E	Litz Wire	PhCoupl MFA Rot Forw	-	
245		Hamilton							
246	S516	Dist MFA Sipper	X8	1	LS_A	Litz Wire	PhCoupl MFA Rot Back	-	
247	S516	Dist MFA Sipper	X8	2	LS_K	Litz Wire	PhCoupl MFA Rot Back	-	
248	S516	Dist MFA Sipper	X8	3	LS_C	Litz Wire	PhCoupl MFA Rot Back	-	
249	S516	Dist MFA Sipper	X8	4	LS_E	Litz Wire	PhCoupl MFA Rot Back	-	
250		Flexible Cable Hamilton							
251	S519	Dist MFA Sipper	X2	1	Crashsensor	Flexible	Dist LLD	X2	
252	S519	Dist MFA Sipper	X2	2	LLD "Signal"	Flexible	Dist LLD	X2	
253	S519	Dist MFA Sipper	X2	3	LLD "Ein"	Flexible	Dist LLD	X2	
254	S519	Dist MFA Sipper	X2	4	LLD "Set"	Flexible	Dist LLD	X2	
255	S519	Dist MFA Sipper	X2	5	Beadmotor +	Flexible		NC	
256	S519	Dist MFA Sipper	X2	6	Beadmotor -	Flexible		NC	
257	S519	Dist MFA Sipper	X2	7	(+15V)	Flexible	Dist LLD	X2	
258	S519	Dist MFA Sipper	X2	8	GND_SEN	Flexible	Dist LLD	X2	
259	S519	Dist MFA Sipper	X2	9	(-15V)	Flexible	Dist LLD	X2	
260	S519	Dist MFA Sipper	X2	10	CSB	Flexible		NC	
261		Cable S5191							
262	S5191	LLD Sipper	X1	1	VDD +15V	Li AWG30	Preamp LLD Sipper	X1	
263	S5191	LLD Sipper	X1	2	AGND	Li AWG30	Preamp LLD Sipper	X1	
264	S5191	LLD Sipper	X1	3	VSS -15V	Li AWG30	Preamp LLD Sipper	X1	
265	S5191	LLD Sipper	X1	4	Sig.	Li AWG30	Preamp LLD Sipper	X1	
266	S5191	LLD Sipper	X1	5	Osz.	Li AWG30	Preamp LLD Sipper	X1	
267		Cable S51911							
268	S51911	LLD Sipper	X3	1	Signal	Li AWG30	Switch Sipper	-	
269	S51911	LLD Sipper	X3	2	GND	Li AWG30	Switch Sipper	-	
270		Hamilton							
271	D1	Base Print 5	X4	1	PHA+	Litz Wire	SM Dilutor	-	
272	D1	Base Print 5	X4	2	PHA_M	Litz Wire	SM Dilutor	-	
273	D1	Base Print 5	X4	3	PHA-	Litz Wire	SM Dilutor	-	
274	D1	Base Print 5	X4	4	PHB+	Litz Wire	SM Dilutor	-	
275	D1	Base Print 5	X4	5	PHB_M	Litz Wire	SM Dilutor	-	
276	D1	Base Print 5	X4	6	PHB-	Litz Wire	SM Dilutor	-	
277		Hamilton							
278	D3	Base Print 5	X5	1	LS_A	Litz Wire	PhCoupler Dilutor Home	-	
279	D3	Base Print 5	X5	2	LS_K	Litz Wire	PhCoupler Dilutor Home	-	
280	D3	Base Print 5	X5	3	LS_C	Litz Wire	PhCoupler Dilutor Home	-	

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
281	D3	Base Print 5	X5	4	LS_E	Litz Wire	LS Dilutor Home	-	
282		Hamilton							
283	D2	Base Print 5	X6	1	PHA+	Litz Wire	SM Valve	-	
284	D2	Base Print 5	X6	2	PHA-	Litz Wire	SM Valve	-	
285	D2	Base Print 5	X6	3	PHB+	Litz Wire	SM Valve	-	
286	D2	Base Print 5	X6	4	N.C.	Litz Wire	SM Valve	-	
287	D2	Base Print 5	X6	5	PHB-	Litz Wire	SM Valve	-	
288		Hamilton							
289	D4	Base Print 5	X7	1	LS_A	Litz Wire	Ph Coupler Valve Home	-	
290	D4	Base Print 5	X7	2	LS_K	Litz Wire	Ph Coupler Valve Home	-	
291	D4	Base Print 5	X7	3	LS_C	Litz Wire	Ph Coupler Valve Home	-	
292	D4	Basisprint 5	X7	4	LS_E	Litz Wire	Ph Coupler Valve Home	-	
293		Hamilton							
294	D5	Base Print 5	X9	1	DC_Motor_V+	Litz Wire	Pump (PSD)	-	
295	D5	Base Print 5	X9	2	DC_Motor_V-	Litz Wire	Pump (PSD)	-	
296		Cable D6							
297	D6	MB	X7	1	CAN_HIGH_IN	Flat	Base Print 5	X3	1
298	D6	MB	X7	2	CAN_LOW_IN	Flat	Base Print 5	X3	2
299	D6	MB	X7	3	CAN_HIGH_OUT	Flat	Base Print 5	X3	3
300	D6	MB	X7	4	CAN_LOW_OUT	Flat	Base Print 5	X3	4
301	D6	MB	X7	5	BR_D MOT+	Flat	Base Print 5	X3	5
302	D6	MB	X7	6	BR_D MOT-	Flat	Base Print 5	X3	6
303	D6	MB	X7	7	Clot_K	Flat	Base Print 5	X3	7
304	D6	MB	X7	8	DV3_D (Reserve)	Flat	Base Print 5	X3	8
305	D6	MB	X7	9	(+) 24V	Flat	Base Print 5	X3	9
306	D6	MB	X7	10	Clot_A	Flat	Base Print 5	X3	10
307	D6	MB	X7	11	GND_5V_SEN	Flat	Base Print 5	X3	11
308	D6	MB	X7	12	GND_5V_SEN	Flat	Base Print 5	X3	12
309	D6	MB	X7	13	(+)5V_SEN	Flat	Base Print 5	X3	13
310	D6	MB	X7	14	(+)5V_SEN	Flat	Base Print 5	X3	14
311	D6	MB	X7	15	LS1_D	Flat	Base Print 5	X3	15
312	D6	MB	X7	16	LS2_D	Flat	Base Print 5	X3	16
313	D6	MB	X7	17	LS3_D	Flat	Base Print 5	X3	17
314	D6	MB	X7	18	LS4_D	Flat	Base Print 5	X3	18
315	D6	MB	X7	19	(+)15V_LLD	Flat	Base Print 5	X3	19
316	D6	MB	X7	20	GND_SEN_LLD	Flat	Base Print 5	X3	20
317	D6	MB	X7	21	(-)15V_LLD	Flat	Base Print 5	X3	21
318	D6	MB	X7	22	EIN_D	Flat	Base Print 5	X3	22
319	D6	MB	X7	23	LLD_D	Flat	Base Print 5	X3	23
320	D6	MB	X7	24	SET_D	Flat	Base Print 5	X3	24

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
321	D6	MB	X7	25	CRH_D	Flat	Base Print 5	X3	25
322	D6	MB	X7	26	CSB_D	Flat	Base Print 5	X3	26
323	D6	MB	X7	27	SM2_S PHA+	Flat	Base Print 5	X3	27
324	D6	MB	X7	28	SM2_D PHA-	Flat	Base Print 5	X3	28
325	D6	MB	X7	29	SM2_D PHB+	Flat	Base Print 5	X3	29
326	D6	MB	X7	30	SM2_D PHB-	Flat	Base Print 5	X3	30
327	D6	MB	X7	31	SM1_D PHA+	Flat	Base Print 5	X3	31
328	D6	MB	X7	32	SM1_D PHA-	Flat	Base Print 5	X3	32
329	D6	MB	X7	33	SM1_D PHB+	Flat	Base Print 5	X3	33
330	D6	MB	X7	34	SM1_D PHB-	Flat	Base Print 5	X3	34
331	D6	MB	X7	35	RES_OUT_D	Flat	Base Print 5	X3	35
332	D6	MB	X7	36	RES_IN_D	Flat	Base Print 5	X3	36
333	D6	MB	X7	37	GND_35V	Flat	Base Print 5	X3	37
334	D6	MB	X7	38	GND_35V	Flat	Base Print 5	X3	38
335	D6	MB	X7	39	GND_35V	Flat	Base Print 5	X3	39
336	D6	MB	X7	40	GND_35V	Flat	Base Print 5	X3	40
337	D6	MB	X7	41	GND_35V	Flat	Base Print 5	X3	41
338	D6	MB	X7	42	(+)35V	Flat	Base Print 5	X3	42
339	D6	MB	X7	43	(+)35V	Flat	Base Print 5	X3	43
340	D6	MB	X7	44	(+)35V	Flat	Base Print 5	X3	44
341	D6	MB	X7	45	GND_24V	Flat	Base Print 5	X3	45
342	D6	MB	X7	46	GND_24V	Flat	Base Print 5	X3	46
343	D6	MB	X7	47	GND_24V	Flat	Base Print 5	X3	47
344	D6	MB	X7	48	(+)24V	Flat	Base Print 5	X3	48
345	D6	MB	X7	49	(+)24V	Flat	Base Print 5	X3	49
346	D6	MB	X7	50	GND_15V	Flat	Base Print 5	X3	50
347	D6	MB	X7	51	GND_15V	Flat	Base Print 5	X3	51
348	D6	MB	X7	52	(-)15V	Flat	Base Print 5	X3	52
349	D6	MB	X7	53	(+)15V	Flat	Base Print 5	X3	53
350	D6	MB	X7	54	GND_5V	Flat	Base Print 5	X3	54
351	D6	MB	X7	55	GND_5V	Flat	Base Print 5	X3	55
352	D6	MB	X7	56	(+)5V	Flat	Base Print 5	X3	56
353	D6	MB	X7	57	GND_5V	Flat	Base Print 5	X3	57
354	D6	MB	X7	58	(+)5V	Flat	Base Print 5	X3	58
355	D6	MB	X7	59	GND_5V	Flat	Base Print 5	X3	59
356	D6	MB	X7	60	(+)5V	Flat	Base Print 5	X3	60
357		Cable D7							
358	D7	Base Print 5	X8	1	DV1 +	Litz Wire	Valve DV1		
359	D7	Base Print 5	X8	2	DV1 -	Litz Wire	Valve DV1		
360		Cable C1 (fixed to Pressure Transducer)							

	Wire	From	Plug	Pin	Signal Name	Cable Type	Type	Plug	Pin
361	C1	Base Print 7	X2	1	+VS 5,2V	Litz Wire	Pressure Transducer	-	
362	C1	Base Print 7	X2	2	VOUT+	Litz Wire	Pressure Transducer	-	
363	C1	Base Print 7	X2	3	VOUT-	Litz Wire	Pressure Transducer	-	
364	C1	Base Print 7	X2	4	-VS GND	Litz Wire	Pressure Transducer	-	
365		Cable D61							
366	D61	MB	X20	1	SM1_D PHA+	Flat	Dist MFA S/R	X1	1
367	D61	MB	X20	2	SM1_D PHA+	Flat	Dist MFA S/R	X1	2
368	D61	MB	X20	3	SM1_D PHA-	Flat	Dist MFA S/R	X1	3
369	D61	MB	X20	4	SM1_D PHA-	Flat	Dist MFA S/R	X1	4
370	D61	MB	X20	5	SM1_D PHB+	Flat	Dist MFA S/R	X1	5
371	D61	MB	X20	6	SM1_D PHB+	Flat	Dist MFA S/R	X1	6
372	D61	MB	X20	7	SM1_D PHB-	Flat	Dist MFA S/R	X1	7
373	D61	MB	X20	8	SM1_D PHB-	Flat	Dist MFA S/R	X1	8
374	D61	MB	X20	9	SM2_D PHA+	Flat	Dist MFA S/R	X1	9
375	D61	MB	X20	10	SM2_D PHA+	Flat	Dist MFA S/R	X1	10
376	D61	MB	X20	11	SM2_D PHA-	Flat	Dist MFA S/R	X1	11
377	D61	MB	X20	12	SM2_D PHA-	Flat	Dist MFA S/R	X1	12
378	D61	MB	X20	13	SM2_D PHB+	Flat	Dist MFA S/R	X1	13
379	D61	MB	X20	14	SM2_D PHB+	Flat	Dist MFA S/R	X1	14
380	D61	MB	X20	15	SM2_D PHB-	Flat	Dist MFA S/R	X1	15
381	D61	MB	X20	16	SM2_D PHB-	Flat	Dist MFA S/R	X1	16
382	D61	MB	X20	17	LS2_D	Flat	Dist MFA S/R	X1	17
383	D61	MB	X20	18	LS3_D	Flat	Dist MFA S/R	X1	18
384	D61	MB	X20	19	LS4_D	Flat	Dist MFA S/R	X1	19
385	D61	MB	X20	20	GND_SEN_5V	Flat	Dist MFA S/R	X1	20
386	D61	MB	X20	21	GND_SEN_5V	Flat	Dist MFA S/R	X1	21
387	D61	MB	X20	22	(+)5V_SEN	Flat	Dist MFA S/R	X1	22
388	D61	MB	X20	23	GND_SEN_5V	Flat	Dist MFA S/R	X1	23
389	D61	MB	X20	24	LS1_D	Flat	Dist MFA S/R	X1	24
390	D61	MB	X20	25	CSB_D	Flat	Dist MFA S/R	X1	25
391	D61	MB	X20	26	(-)15V_LLD	Flat	Dist MFA S/R	X1	26
392	D61	MB	X20	27	GND_SEN_LLD	Flat	Dist MFA S/R	X1	27
393	D61	MB	X20	28	(+)15V_LLD	Flat	Dist MFA S/R	X1	28
394	D61	MB	X20	29	BR_D_MOT-	Flat	Dist MFA S/R	X1	29
395	D61	MB	X20	30	BR_D_MOT+	Flat	Dist MFA S/R	X1	30
396	D61	MB	X20	31	SET_D	Flat	Dist MFA S/R	X1	31
397	D61	MB	X20	32	EIN_D	Flat	Dist MFA S/R	X1	32
398	D61	MB	X20	33	LLD_D	Flat	Dist MFA S/R	X1	33
399	D61	MB	X20	34	CRH_D	Flat	Dist MFA S/R	X1	34
400		Hamilton							

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
401	D611	Dist MFA S/R	X3	1	SM1_D PHA+	Litz Wire	SM MFA Vert	-	
402	D611	Dist MFA S/R	X3	2	SM1_D PHA_M	Litz Wire	SM MFA Vert	-	
403	D611	Dist MFA S/R	X3	3	SM1_D PHA-	Litz Wire	SM MFA Vert	-	
404	D611	Dist MFA S/R	X3	4	SM1_D PHB+	Litz Wire	SM MFA Vert	-	
405	D611	Dist MFA S/R	X3	5	SM1_D PHB_M	Litz Wire	SM MFA Vert	-	
406	D611	Dist MFA S/R	X3	6	SM1_D PHB-	Litz Wire	SM MFA Vert	-	
407		Hamliton							
408	D612	Dist MFA S/R	X4	1	SM2_D PHA+	Litz Wire	SM MFA Rot	-	
409	D612	Dist MFA S/R	X4	2	SM2_D PHA_M	Litz Wire	SM MFA Rot	-	
410	D612	Dist MFA S/R	X4	3	SM2_D PHA-	Litz Wire	SM MFA Rot	-	
411	D612	Dist MFA S/R	X4	4	NC		SM MFA Rot	-	
412	D612	Dist MFA S/R	X4	5	SM2_D PHB+	Litz Wire	SM MFA Rot	-	
413	D612	Dist MFA S/R	X4	6	SM2_D PHB_M	Litz Wire	SM MFA Rot	-	
414	D612	Dist MFA S/Rr	X4	7	SM2_D PHB-	Litz Wire	SM MFA Rot	-	
415		Hamliton							
416	D613	Dist MFA S/R	X5	3	OUT	Litz Wire	HS MFA Home Vert	-	
417	D613	Dist MFA S/R	X5	2	GND	Litz Wire	HS MFA Home Vert	-	
418	D613	Dist MFA S/R	X5	1	(+) 5V	Litz Wire	HS MFA Home Vert	-	
419		Hamliton							
420	D614	Dist MFA S/R	X6	1	LS_A	Litz Wire	PhCoup MFA Home Rot	-	
421	D614	Dist MFA S/R	X6	2	LS_K	Litz Wire	PhCoup MFA Home Ro	-	
422	D614	Dist MFA S/R	X6	3	LS_C	Litz Wire	PhCoup MFA Home Ro	-	
423	D614	Dist MFA S/R	X6	4	LS_E	Litz Wire	PhCoup MFA Home Ro	-	
424		Hamliton							
425	D615	Dist MFA S/R	X7	1	LS_A	Litz Wire	PhCoup MFA Rot Forw	-	
426	D615	Dist MFA S/R	X7	2	LS_K	Litz Wire	PhCoup MFA Rot Forw	-	
427	D615	Dist MFA S/R	X7	3	LS_C	Litz Wire	PhCoup MFA Rot Forw	-	
428	D615	Dist MFA S/R	X7	4	LS_E	Litz Wire	PhCoup MFA Rot Forw	-	
429		Hamliton							
430	D616	Dist MFA S/R	X8	1	LS_A	Litz Wire	PhCoup MFA Rot Back	-	
431	D616	Dist MFA S/R	X8	2	LS_K	Litz Wire	PhCoup MFA Rot Back	-	
432	D616	Dist MFA S/R	X8	3	LS_C	Litz Wire	PhCoup MFA Rot Back	-	
433	D616	Dist MFA S/R	X8	4	LS_E	Litz Wire	PhCoup MFA Rot Back	-	
434		Flexible Cable Hamilton							
435	D617	Dist MFA S/R	X2	1	Crashsensor	Flexible	Dist LLD	X2	
436	D617	Dist MFA S/R	X2	2	LLD"Signal"	Flexible	Dist LLD	X2	
437	D617	Dist MFA S/R	X2	3	LLD "Ein"	Flexible	Dist LLD	X2	
438	D617	Dist MFA S/R	X2	4	LLD "Set"	Flexible	Dist LLD	X2	
439	D617	Dist MFA S/R	X2	5	Beadmotor+	Flexible	Dist LLD	X2	
440	D617	Dist MFA S/R	X2	6	Beadmotor-	Flexible	Dist LLD	X2	

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
441	D617	MFA Dist S/R	X2	7	(+15V)	Flexible	Dist LLD	X2	
442	D617	MFA Dist S/R	X2	8	GND	Flexible	Dist LLD	X2	
443	D617	MFA Dist S/R	X2	9	(-15V)	Flexible	Dist LLD	X2	
444	D617	MFA Dist S/R	X2	10	Chrash Beads	Flexible	Dist LLD	X2	
445		Cable D6171							
446	D6171	LLD S/R	X1	1	VDD +15V	Li AWG30	Preamp LLD S/R	X1	1
447	D6171	LLD S/R	X1	2	AGND	Li AWG30	Preamp LLD S/R	X1	2
448	D6171	LLD S/R	X1	3	VSS -15V	Li AWG30	Preamp LLD S/R	X1	3
449	D6171	LLD S/R	X1	4	Sig.	Li AWG30	Preamp LLD S/R	X1	4
450	D6171	LLD S/R	X1	5	Osz.	Li AWG30	Preamp LLD S/R	X1	5
451		Cable D61711							
452	D61711	LLD S/R	X3	1	Singnal	Li AWG30	Switch Sipper	-	
453	D61711	LLD S/R	X3	2	GND	Li AWG30	Switch Sipper	-	
454		Cable D61713							
455	D61713	LLD S/R	X5	1	Beadmotor +	Li AWG30	Motor Beadmotor	-	
456	D61713	LLD S/R	X5	2	Beadmotor -	Li AWG30	Motor Beadmotor	-	
457		Cable D61714							
458	D61714	LLD S/R	X4	1	Signal	Li AWG30	Switch Sipper	-	
459	D61714	LLD S/R	X4	2	GND	Li AWG30	Switch Sipper	-	
460		Cable T1							
461	T1	MB	X9	1	EECS_1~	Flat 10p	Preamp Temp Bottle 1	X1	1
462	T1	MB	X9	2	ACS_1~	Flat 10p	Preamp Temp Bottle 1	X1	2
463	T1	MB	X9	3	ADIN	Flat 10p	Preamp Temp Bottle 1	X1	3
464	T1	MB	X9	4	ADOUT	Flat 10p	Preamp Temp Bottle 1	X1	4
465	T1	MB	X9	5	ASCLK	Flat 10p	Preamp Temp Bottle 1	X1	5
466	T1	MB	X9	6	AEOC_1	Flat 10p	Preamp Temp Bottle 1	X1	6
467	T1	MB	X9	7	AGND	Flat 10p	Preamp Temp Bottle 1	X1	7
468	T1	MB	X9	8	(+)15V	Flat 10p	Preamp Temp Bottle 1	X1	8
469	T1	MB	X9	9	(-)15V	Flat 10p	Preamp Temp Bottle 1	X1	9
470	T1	MB	X9	10	AGND	Flat 10p	Preamp Temp Bottle 1	X1	10
471									
472	T11	Preamp Temp Bottle 1	X2	1	Fühl1	Litz Wire	Sensor	-	
473	T11	Preamp Temp Bottle 1	X2	2	Fühl2	Litz Wire	Sensor	-	
474		Cable T2							
475	T2	MB	X11	b1	Pelt+ P1_OUT1	Li AWG18	Peltier Assy 1	X1	3
476	T2	MB	X11	b2	Pelt- P1_OUT2	Li AWG18	Peltier Assy 1	X1	2
477	T2	MB	X11	a1	Lüft1+ (24V)	Li AWG18	Peltier Assy 1, Fan	X1	1
478	T2	MB	X11	a6	Lüft1- (GND)	Li AWG18	Peltier Assy 1, Fan	X1	4
479		Cable T1							
480	T1	MB	X9	11	EECS_2~	Flat 10p	Preamp Temp Bottle 2	X1	1

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
481	T1	MB	X9	12	ACS_2~	Flat 10p	Preamp Temp Bottle 2	X1	2
482	T1	MB	X9	13	ADIN	Flat 10p	Preamp Temp Bottle 2	X1	3
483	T1	MB	X9	14	ADOUT	Flat 10p	Preamp Temp Bottle 2	X1	4
484	T1	MB	X9	15	ASCLK	Flat 10p	Preamp Temp Bottle 2	X1	5
485	T1	MB	X9	16	AEOC_2	Flat 10p	Preamp Temp Bottle 2	X1	6
486	T1	MB	X9	17	AGND	Flat 10p	Preamp Temp Bottle 2	X1	7
487	T1	MB	X9	18	(+)15V	Flat 10p	Preamp Temp Bottle 2	X1	8
488	T1	MB	X9	19	(-)15V	Flat 10p	Preamp Temp Bottle 2	X1	9
489	T1	MB	X9	20	AGND	Flat 10p	Preamp Temp Bottle 2	X1	10
490									
491	T31	Preamp Temp Bottle 2	X2	1	Fühl1	Litz Wire	Sensor	-	
492	T31	Preamp Temp Bottle 2	X2	2	Fühl2	Litz Wire	Sensor	-	
493		Cable T2							
494	T2	MB	X11	b3	Pelt+ P2_OUT1	Li AWG18	Peltier Assy 2	X1	3
495	T2	MB	X11	b4	Pelt- P2_OUT2	Li AWG18	Peltier Assy 2	X1	2
496	T2	MB	X11	a2	Lüft2+ (24V)	Li AWG18	Peltier Assy 2, Fan	X1	1
497	T2	MB	X11	a7	Lüft2- (GND)	Li AWG18	Peltier Assy 2, Fan	X1	4
498		Cable T1							
499	T1	MB	X9	21	EECS_3~	Flat 10p	PreampTempPreheater	X1	1
500	T1	MB	X9	22	ACS_3~	Flat 10p	PreampTempPreheater	X1	2
501	T1	MB	X9	23	ADIN	Flat 10p	PreampTempPreheater	X1	3
502	T1	MB	X9	24	ADOUT	Flat 10p	PreampTempPreheater	X1	4
503	T1	MB	X9	25	ASCLK	Flat 10p	PreampTempPreheater	X1	5
504	T1	MB	X9	26	AEOC_3	Flat 10p	PreampTempPreheater	X1	6
505	T1	MB	X9	27	AGND	Flat 10p	PreampTempPreheater	X1	7
506	T1	MB	X9	28	(+)15V	Flat 10p	PreampTempPreheater	X1	8
507	T1	MB	X9	29	(-)15V	Flat 10p	PreampTempPreheater	X1	9
508	T1	MB	X9	30	AGND	Flat 10p	PreampTempPreheater	X1	10
509									
510	T51	Preamp Temp Preheater	X2	1	Fühl1	Litz Wire	Sensor	-	
511	T51	Preamp Temp Preheater	X2	2	Fühl2	Litz Wire	Sensor		
512		Cable T2							
513	T2	MB	X11	b5	Pelt+ P3_OUT1	Li AWG18	Peltier Assy 3	X1	3
514	T2	MB	X11	b6	Pelt- P3_OUT2	Li AWG18	Peltier Assy 3	X1	2
515	T2	MB	X11	a3	Lüft3+ (24V)	Li AWG18	Peltier Assy 3, Fan	X1	1
516	T2	MB	X11	a8	Lüft3- (GND)	Li AWG18	Peltier Assy 3, Fan	X1	4
517		Cable T1							
518	T2	MB	X11	b7	Pelt+ P4_OUT1	Li AWG18	Peltier Assy 4	X1	3
519	T2	MB	X11	b8	Pelt- P4_OUT2	Li AWG18	Peltier Assy 4	X1	2
520	T2	MB	X11	a4	Lüft4+ (24V)	Li AWG18	Peltier Assy 4, Fan	X1	1

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
521	T2	MB	X11	a9	Lüft4- (GND)	Li AWG18	Peltier Assy 4, Fan	X1	4
522		Cable T1							
523	T1	MB	X9	31	EECS-5~	Flat 10p	Preamp Temp Inside	X1	1
524	T1	MB	X9	32	ACS_5~	Flat 10p	Preamp Temp Inside	X1	2
525	T1	MB	X9	33	ADIN	Flat 10p	Preamp Temp Inside	X1	3
526	T1	MB	X9	34	ADOUT	Flat 10p	Preamp Temp Inside	X1	4
527	T1	MB	X9	35	ASCLK	Flat 10p	Preamp Temp Inside	X1	5
528	T1	MB	X9	36	AEOC_5~	Flat 10p	Preamp Temp Inside	X1	6
529	T1	MB	X9	37	AGND	Flat 10p	Preamp Temp Inside	X1	7
530	T1	MB	X9	38	(+)15V	Flat 10p	Preamp Temp Inside	X1	8
531	T1	MB	X9	39	(-)15V	Flat 10p	Preamp Temp Inside	X1	9
532	T1	MB	X9	40	AGND	Flat 10p	Preamp Temp Inside	X1	10
533		Cable T2							
534	T2	MB	X11	b9	Pelt+ P5_OUT1	Li AWG18	Peltier Assy 5	X1	3
535	T2	MB	X11	b10	Pelt- P5_OUT2	Li AWG18	Peltier Assy 5	X1	2
536	T2	MB	X11	a5	Lüft5+ (24V)	Li AWG18	Peltier Assy 5, Fan	X1	1
537	T2	MB	X11	a10	Lüft5- (GND)	Li AWG18	Peltier Assy 5, Fan	X1	4
538		Cable T1							
539	T1	MB	X9	41	(+)15V	Flat	LLD Waste	X1	1
540	T1	MB	X9	42	GND	Flat	LLD Waste	X1	2
541	T1	MB	X9	43	(-)15V	Flat	LLD Waste	X1	3
542	T1	MB	X9	44	FWEIN_T	Flat	LLD Waste	X1	4
543	T1	MB	X9	45	FWA90_T	Flat	LLD Waste	X1	5
544	T1	MB	X9	46	Haub_T	Flat	LLD Waste	X1	6
545	T1	MB	X9	47	(+)5V	Flat	LLD Waste	X1	7
546	T1	MB	X9	48	GND_1	Flat	LLD Waste	X1	8
547		Cable T121							
548	T121	LLD Waste	X1	1	Elekt +	Litz Wire	Electrode LLD	-	
549	T121	LLD Waste	X1	2	Elekt -	Litz Wire	Electrode LLD	-	
550		Cable T122							
551	T122	LLD Waste	X2	1	HAUB_1	Litz Wire	Microswitch 1	-	
552	T122	LLD Waste	X2	2	GND	Litz Wire	Microswitch 1	-	
553		Cable T161 (fixed to Photo Coupler)							
554	T161	Dist Keyboard	X5	1	LED Anode	Litz Wire	Photo Coupler STAT	-	
555	T161	Dist Keyboard	X5	2	LED Kath.	Litz Wire	Photo Coupler STAT	-	
556	T161	Dist Keyboard	X5	3	VCC	Litz Wire	Photo Coupler STAT	-	
557	T161	Dist Keyboard	X5	4	OUT	Litz Wire	Photo Coupler STAT	-	
558	T161	Dist Keyboard	X5	5	GND	Litz Wire	Photo Coupler STAT	-	
559		Cable T171 (fixed to Magnet)							
560	T171	Dist Keyboard	X6	1	STVERT 1	Litz Wire	Verriegelungsmagnet ST	-	

	Cable	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
561	T171	Dist Keyboard	X6	2	STVERT 2	Litz Wire	Verriegelungsmagnet ST	-	
562		Cable R1							
563	R1	MB	X17	1	(+)5V	Li AWG22	Dist Sample Rotor	X1	1
564	R1	MB	X17	2	GND	Li AWG22	Dist Sample Rotor	X1	2
565	R1	MB	X17	3	LS 8_R Lage ges.	Li AWG22	Dist Sample Rotor	X1	3
566	R1	MB	X17	4	LS 5_R Home	Li AWG22	Dist Sample Rotor	X1	4
567	R1	MB	X17	5	LS 6_R Vorw.	Li AWG22	Dist Sample Rotor	X1	5
568	R1	MB	X17	6	LS 7_R Rückw.	Li AWG22	Dist Sample Rotor	X1	6
569	R1	MB	X17	7	VENT_R,V dreht	Li AWG22	Dist Sample Rotor	X1	7
570	R1	MB	X17	8	SM1_R, Phase A+	Li AWG22	Dist Sample Rotor	X1	15
571	R1	MB	X17	9	SM1_R, Phase A-	Li AWG22	Dist Sample Rotor	X1	16
572	R1	MB	X17	10	SM1_R, Phase B+	Li AWG22	Dist Sample Rotor	X1	17
573	R1	MB	X17	11	SM1_R, Phase B-	Li AWG22	Dist Sample Rotor	X1	18
574	R1	MB	X17	12	(+)24V	Li AWG22	Dist Sample Rotor	X1	19
575	R1	MB	X17	13	GND_ 24V	Li AWG22	Dist Sample Rotor	X1	20
576	R1	MB	X17	14	GND Haubensch.2	Li AWG22	Dist Sample Rotor	X1	8
577	R1	MB	X17	15	Interlock 2(Haub.2)	Li AWG22	Dist Sample Rotor	X1	9
578		Cable R11 (fixed to Motor)							
579	R11	Dist Sample Rotor	X2	1	SM1_R, Phase A+	Litz Wire	SM Sample Rotor	-	
580	R11	Dist Sample Rotor	X2	2	SM1_R, Phase A-	Litz Wire	SM Sample Rotor	-	
581	R11	Dist Sample Rotor	X2	3	SM1_R, Phase B+	Litz Wire	SM Sample Rotor	-	
582	R11	Dist Sample Rotor	X2	4	SM1_R, Phase B-	Litz Wire	SM Sample Rotor	-	
583		Cable R12 (fixed to Photo Coupler)							
584	R12	Dist Sample Rotor	X3	1	LS_A, LS5_R	Litz Wire	PhCoupl Sample Home	-	
585	R12	Dist Sample Rotor	X3	2	LS_K	Litz Wire	PhCoupl Sample Home	-	
586	R12	Dist Sample Rotorr	X3	3	LS_VCC	Litz Wire	PhCoupl Sample Home	-	
587	R12	Dist Sample Rotoror	X3	4	LS_OUT	Litz Wire	PhCoupl Sample Home	-	
588	R12	Dist Sample Rotor	X3	5	LS_GND	Litz Wire	PhCoupl Sample Home	-	
589		Cable R13 (fixed to Photo Coupler)							
590	R13	Dist Sample Rotor	X4	1	LS_A. LS6_R	Litz Wire	PhCoupl Sample Forw	-	
591	R13	Dist Sample Rotor	X4	2	LS_K	Litz Wire	PhCoupl Sample Forw	-	
592	R13	Dist Sample Rotor	X4	3	LS_VCC	Litz Wire	PhCoupl Sample Forw	-	
593	R13	Dist Sample Rotor	X4	4	LS_OUT	Litz Wire	PhCoupl Sample Forw	-	
594	R13	Dist Sample Rotor	X4	5	LS_GND	Litz Wire	PhCoupl Sample Forw	-	
595		Cable R14 (fixed to Photo Coupler)							
596	R14	Dist Sample Rotor	X5	1	LS_A, LS7_R	Litz Wire	PhCoupl Sample Backw	-	
597	R14	Dist Sample Rotor	X5	2	LS_K	Litz Wire	PhCoupl Sample Backw	-	
598	R14	Dist Sample Rotor	X5	3	LS_VCC	Litz Wire	PhCoupl Sample Backw	-	
599	R14	Dist Sample Rotor	X5	4	LS_OUT	Litz Wire	PhCoupl Sample Backw	-	
600	R14	Dist Sample Rotor	X5	5	LS_GND	Litz Wire	PhCoupl Sample Backw	-	

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
601		Cable R17 (fixed to Photo Coupler)							
602	R17	Dist Sample Rotor	X6	1	LS_A, LS8_R	Litz Wire	PhCoupl Lage eingesteckt	-	
603	R17	Dist Sample Rotor	X6	2	LS_K	Litz Wire	LS Lage eingesteckt	-	
604	R17	Dist Sample Rotor	X6	3	LS_VCC	Litz Wire	LS Lage eingesteckt	-	
605	R17	Dist Sample Rotor	X6	4	LS_OUT	Litz Wire	LS Lage eingesteckt	-	
606	R17	Dist Sample Rotor	X6	5	LS_GND	Litz Wire	LS Lage eingesteckt	-	
607		Cable R17 (fixed to Fan)							
608	R16	Dist Sample Rotor	X7	1	VENT1_R +	Litz Wire	Fan	-	
609	R16	Dist Sample Rotor	X7	2	VENT_R	Litz Wire	Fan	-	
610	R16	Dist Sample Rotor	X7	3	VENT1_R -	Litz Wire	Fan	-	
611		Cable Assy R10							
612	R10	Dist Sample Rotor	X8	1	GND Haubensch.2	Li AWG22	Microswitch 2	-	
613	R10	Dist Sample Rotor	X8	2	Interlock2(Haub.2)	Li AWG22	Microswitch 2	-	
614		Cable R2							
615	R2	MB	X16	1	(+)5V	Li AWG22	Dist Incubator Rotor	X1	1
616	R2	MB	X16	2	GND	Li AWG22	Dist Incubator Rotor	X1	2
617	R2	MB	X16	3	LS 4_R Lage ges.	Li AWG22	Dist Incubator Rotor	X1	3
618	R2	MB	X16	4	LS1_R Home	Li AWG22	Dist Incubator Rotor	X1	4
619	R2	MB	X16	5	LS2_R Vorw.	Li AWG22	Dist Incubator Rotor	X1	5
620	R2	MB	X16	6	LS3_R Rückw.	Li AWG22	Dist Incubator Rotor	X1	6
621	R2	MB	X16	7	VENT_R, V.dreht	Li AWG22	Dist Incubator Rotor	X1	7
622	R2	MB	X16	8	Masse Rotor	Li AWG22	Dist Incubator Rotor	X1	8
623	R2	MB	X16	9	(+)35V	Li AWG22	Dist Incubator Rotor	X1	9
624	R2	MB	X16	10	GND 35V	Li AWG22	Dist Incubator Rotor	X1	10
625	R2	MB	X16	11	CAN _HIGH_IN	Li AWG22	Dist Incubator Rotor	X1	11
626	R2	MB	X16	12	CAN_LOW_IN	Li AWG22	Dist Incubator Rotor	X1	12
627	R2	MB	X16	13	(+)15V	Li AWG22	Dist Incubator Rotor	X1	13
628	R2	MB	X16	14	GND 15V	Li AWG22	Dist Incubator Rotor	X1	14
629	R2	MB	X16	15	SM2_R, Phase A+	Li AWG22	Dist Incubator Rotor	X1	15
630	R2	MB	X16	16	SM2_R, Phase A-	Li AWG22	Dist Incubator Rotor	X1	16
631	R2	MB	X16	17	SM2_R, Phase B+	Li AWG22	Dist Incubator Rotor	X1	17
632	R2	MB	X16	18	SM2_R, Phase B-	Li AWG22	Dist Incubator Rotor	X1	18
633	R2	MB	X16	19	(+)24V	Li AWG22	Dist Incubator Rotor	X1	19
634	R2	MB	X16	20	GND_ 24V	Li AWG22	Dist Incubator Rotor	X1	20
635		Cable R21 (fixed to Motor)							
636	R21	Dist Incubator Rotor	X2	1	SM2_R, Phase A+	Litz Wire	SM Incubator Rotor	-	
637	R21	Dist Incubator Rotor	X2	2	SM2_R, Phase A-	Litz Wire	SM Incubator Rotor	-	
638	R21	Dist Incubator Rotor	X2	3	SM2_R, Phase B+	Litz Wire	SM Incubator Rotor	-	
639	R21	Dist Incubator Rotor	X2	4	SM2_R, Phase B-	Litz Wire	SM Incubator Rotor	-	
640		Cable R22 (fixed to Photo Coupler)							

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
641	R22	Dist Incubator Rotor	X3	1	LS_A, LS1_R	Litz Wire	Photo Coupler Inc Home	-	
642	R22	Dist Incubator Rotor	X3	2	LS_K	Litz Wire	Photo Coupler Inc Home	-	
643	R22	Dist Incubator Rotor	X3	3	LS_VCC	Litz Wire	Photo Coupler Inc Home	-	
644	R22	Dist Incubator Rotor	X3	4	LS_OUT	Litz Wire	Photo Coupler Inc Home	-	
645	R22	Dist Incubator Rotor	X3	5	LS_GND	Litz Wire	Photo Coupler Inc Home	-	
646		Cable R23 (fixed to Photo Coupler)							
647	R23	Dist Incubator Rotor	X4	1	LS_A, LS2_R	Litz Wire	Photo Coupler Inc Forw	-	
648	R23	Dist Incubator Rotor	X4	2	LS_K	Litz Wire	Photo Coupler Inc Forw	-	
649	R23	Dist Incubator Rotor	X4	3	LS_VCC	Litz Wire	Photo Coupler Inc Forw	-	
650	R23	Dist Incubator Rotor	X4	4	LS_OUT	Litz Wire	Photo Coupler Inc Forw	-	
651	R23	Dist Incubator Rotor	X4	5	LS_GND	Litz Wire	Photo Coupler Inc Forw	-	
652		Cable R24 (fixed to Photo Coupler)							
653	R24	Dist Incubator Rotor	X5	1	LS_A. LS3_R	Litz Wire	PhCoupler Inc Backw	-	
654	R24	Dist Incubator Rotor	X5	2	LS_K	Litz Wire	PhCoupler Inc Backw	-	
655	R24	Dist Incubator Rotor	X5	3	LS_VCC	Litz Wire	PhCoupler Inc Backw	-	
656	R24	Dist Incubator Rotor	X5	4	LS_OUT	Litz Wire	PhCoupler Inc Backw	-	
657	R24	Dist Incubator Rotor	X5	5	LS_GND	Litz Wire	PhCoupler Inc Backw	-	
658		Cable R25 (fixed to Photo Coupler)							
659	R25	Dist Incubator Rotor	X6	1	LS_A; LS4_R	Litz Wire	Photo Coupler Inc Pos	-	
660	R25	Dist Incubator Rotor	X6	2	LS_K	Litz Wire	Photo Coupler Inc Pos	-	
661	R25	Dist Incubator Rotor	X6	3	LS_VCC	Litz Wire	Photo Coupler Inc Pos	-	
662	R25	Dist Incubator Rotor	X6	4	LS_OUT	Litz Wire	Photo Coupler Inc Pos	-	
663	R25	Dist Incubator Rotor	X6	5	LS_GND	Litz Wire	Photo Coupler Inc Pos	-	
664		Cable R26 (fixed to Fan)							
665	R26	Dist Incubator Rotor	X7	1	VENT2_R +	Litz Wire	Fan	-	
666	R26	Dist Incubator Rotor	X7	2	VENT2_R -	Litz Wire	Fan	-	
667		Cable R27							
668	R27	Dist Incubator Rotor	X8	4	CAN_High	Litz Wire	Base Print 6 Incubation	X9	
669	R27	Dist Incubator Rotor	X8	5	CAN_Low	Litz Wire	Base Print 6 Incubation	X9	
670	R27	Dist Incubator Rotor	X8	6	(+)15V	Litz Wire	Base Print 6 Incubation	X9	
671	R27	Dist Incubator Rotor	X8	7	GND 15V	Litz Wire	Base Print 6 Incubation	X9	
672	R27	Dist Incubator Rotor	X8	2	(+) 35V	Litz Wire	Base Print 6 Incubation	X9	
673	R27	Dist Incubator Rotor	X8	3	GND 35V	Litz Wire	Base Print 6 Incubation	X9	
674	R27	Dist Incubator Rotor	X8	1	Masse Rotor	Litz Wire	Base Print 6 Incubation	X9	
675									
676	R271_1	Base Print 6 Incubation	LP4			Litzsoldered	Sensor	-	
677	R271_1	Base Print 6 Incubation	LP5			Litzsoldered	Sensor	-	
678	R271_2	Base Print 6 Incubation	LP6			Litzsoldered	Sensor	-	
679	R271_2	Base Print 6 Incubation	LP7			Litzsoldered	Sensor	-	
680	R271_3	Base Print 6 Incubation	LP8			Litzsoldered	Sensor	-	

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
681	R271_3	Base Print 6 Incubation	LP9			Litzsoldered	Sensor	-	
682	R271_4	Base Print 6 Incubation	LP10			Litzsoldered	Sensor	-	
683	R271_4	Base Print 6 Incubation	LP11			Litzsoldered	Sensor	-	
684									
685	R272_1	Base Print 6 Incubation	X5	1	(+)36V	Heat Foil1	Heater Resistor	-	
686	R272_1	Base Print 6 Incubation	X5	2	(+)36V	Heat Foil1	Heater Resistor	-	
687	R272_1	Base Print 6 Incubation	X5	3	PGND	Heat Foil1	Heater Resistor	-	
688	R272_1	Base Print 6 Incubation	X5	4	PGND	Heat Foil1	Heater Resistor	-	
689	R272_2	Base Print 6 Incubation	X6	1	(+)36V	Heat Foil2	Heater Resistor	-	
690	R272_2	Base Print 6 Incubation	X6	2	(+)36V	Heat Foil2	Heater Resistor	-	
691	R272_2	Base Print 6 Incubation	X6	3	PGND	Heat Foil2	Heater Resistor	-	
692	R272_2	Base Print 6 Incubation	X6	4	PGND	Heat Foil2	Heater Resistor	-	
693	R272_3	Base Print 6 Incubation	X7	1	(+)36V	Heat Foil3	Heater Resistor	-	
694	R272_3	Base Print 6 Incubation	X7	2	(+)36V	Heat Foil3	Heater Resistor	-	
695	R272_3	Base Print 6 Incubation	X7	3	PGND	Heat Foil3	Heater Resistor	-	
696	R272_3	Base Print 6 Incubation	X7	4	PGND	Heat Foil3	Heater Resistor	-	
697	R272_4	Base Print 6 Incubation	X8	1	(+)36V	Heat Foil4	Heater Resistor	-	
698	R272_4	Base Print 6 Incubation	X8	2	(+)36V	Heat Foil4	Heater Resistor	-	
699	R272_4	Base Print 6 Incubation	X8	3	PGND	Heat Foil4	Heater Resistor	-	
700	R272_4	Base Print 6 Incubation	X8	4	PGND	Heat Foil4	Heater Resistor	-	
701									
702	R273_1	Base Print 6 Incubation	X1	1	LS_A	Litz Wire	PhCoupl SegmDetection	-	
703	R273_1	Base Print 6 Incubation	X1	2	LS_K	Litz Wire	PhCoupl SegmDetection	-	
704	R273_1	Base Print 6 Incubation	X1	3	LS_E	Litz Wire	PhCoupl SegmDetection	-	
705	R273_1	Base Print 6 Incubation	X1	4	LS_C	Litz Wire	PhCoupl SegmDetection	-	
706	R273_2	Base Print 6 Incubation	X2	1	LS_A	Litz Wire	PhCoupl SegmDetection	-	
707	R273_2	Base Print 6 Incubation	X2	2	LS_K	Litz Wire	PhCoupl SegmDetection	-	
708	R273_2	Base Print 6 Incubation	X2	3	LS_E	Litz Wire	PhCoupl SegmDetection	-	
709	R273_2	Base Print 6 Incubation	X2	4	LS_C	Litz Wire	PhCoupl SegmDetection	-	
710	R273_3	Base Print 6 Incubation	X3	1	LS_A	Litz Wire	PhCoupl SegmDetection	-	
711	R273_3	Base Print 6 Incubation	X3	2	LS_K	Litz Wire	PhCoupl SegmDetection	-	
712	R273_3	Base Print 6 Incubation	X3	3	LS_E	Litz Wire	PhCoupl SegmDetection	-	
713	R273_3	Base Print 6 Incubation	X3	4	LS_C	Litz Wire	PhCoupl SegmDetection	-	
714	R273_4	Base Print 6 Incubation	X4	1	LS_A	Litz Wire	PhCoupl SegmDetection	-	
715	R273_4	Base Print 6 Incubation	X4	2	LS_K	Litz Wire	PhCoupl SegmDetection	-	
716	R273_4	Base Print 6 Incubation	X4	3	LS_E	Litz Wire	PhCoupl SegmDetection	-	
717	R273_4	Base Print 6 Incubation	X4	4	LS_C	Litz Wire	PhCoupl SegmDetection	-	
718		Cable R3							
719	R3	MB	X18	7,8	PWD_R_+	Flat	Waste/Water Distributor	X1	7,8
720	R3	MB	X18	9,10	PWD_R_-	Flat	Waste/Water Distributor	X1	9,10

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
721	R3	MB	X18	13,14	PW_R+	Flat	Waste/Water Distributor	X1	13,14
722	R3	MB	X18	15,16	PW_R-	Flat	Waste/Water Distributor	X1	15,16
723	R3	MB	X18	23,24	PWS_R+	Flat	Waste/Water Distributor	X1	23,24
724	R3	MB	X18	25,26	PWS_R-	Flat	Waste/Water Distributor	X1	25,26
725	R3	MB	X18	17	RES1_R	Flat	Waste/Water Distributor	X1	17
726	R3	MB	X18	18	RES1_R	Flat	Waste/Water Distributor	X1	18
727	R3	MB	X18	11	VAS1_R +	Flat	Waste/Water Distributor	X1	11
728	R3	MB	X18	12	VAS1_R -	Flat	Waste/Water Distributor	X1	12
729	R3	MB	X18	19	VM1_S +	Flat	Waste/Water Distributor	X1	19
730	R3	MB	X18	20	VM1_S -	Flat	Waste/Water Distributor	X1	20
731	R3	MB	X18	1	VAB1_S+	Flat	Waste/Water Distributor	X1	1
732	R3	MB	X18	2	VAB1_S-	Flat	Waste/Water Distributor	X1	2
733	R3	MB	X18	3	VWD1_R+	Flat	Waste/Water Distributor	X1	3
734	R3	MB	X18	4	VWD1_R-	Flat	Waste/Water Distributor	X1	4
735	R3	MB	X18	31	VWD2_R+	Flat	Waste/Water Distributor	X1	31
736	R3	MB	X18	32	VWD2_R-	Flat	Waste/Water Distributor	X1	32
737	R3	MB	X18	29	VWB1_R+	Flat	Waste/Water Distributor	X1	29
738	R3	MB	X18	30	VWB1_R-	Flat	Waste/Water Distributor	X1	30
739	R3	MB	X18	27	VWS1_R+	Flat	Waste/Water Distributor	X1	27
740	R3	MB	X18	28	VWS1_R-	Flat	Waste/Water Distributor	X1	28
741	R3	MB	X18	21	VAD1_R+	Flat	Waste/Water Distributor	X1	21
742	R3	MB	X18	22	VAD1_R-	Flat	Waste/Water Distributor	X1	22
743	R3	MB	X18	5	VAD2_R+	Flat	Waste/Water Distributor	X1	5
744	R3	MB	X18	6	VAD2_R	Flat	Waste/Water Distributor	X1	6
745	R3	MB	X18	33	RES2_R	Flat	Waste/Water Distributor	X1	33
746	R3	MB	X18	34	RES2_R	Flat	Waste/Water Distributor	X1	34
747		Cable R31 (fixed to Pump)							
748	R31	Waste/Water Distributor	X2	1	PWD+	Litz Wire	Pump Wash S/R	-	
749	R31	Waste/Water Distributor	X2	2	PWD-	Litz Wire	Pump Wash S/R	-	
750		Cable R32 (Extension)							
751	R32	Waste/Water Distributor	X3	1	PW+	Litz Wire	Pump Waste (Extension)		1
752	R32	Waste/Water Distributor	X3	2	PW-	Litz Wire	Pump Waste (Extension)		2
753		Cable R33 (fixed to Pump)							
754	R33	Waste/Water Distributor	X4	1	PWS+	Litz Wire	Pump Wash Sipper	-	
755	R33	Waste/Water Distributor	X4	2	PWS-	Litz Wire	Pump Wash Sipper	-	
756		Cable R34 (Extension)							
757	R34	Waste/Water Distributor	X5	1	VAS1+	Litz Wire	Valve VAS1 Zul. (Ext)		1
758	R34	Waste/Water Distributor	X5	2	VAS1-	Litz Wire	Valve VAS1 Zul. (Ext)		2
759		Cable R35 (Extension)							
760	R35	Waste/Water Distributor	X6	1	VM1+	Litz Wire	Valve VM1 Zul. (Extension)		1

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
761	R35	Waste/Water Distributor	X6	2	VM1-	Litz Wire	Valve VM1 Zul. (Ext)		2
762		Cable (fixed to Valve)							
763	R36	Waste/Water Distributor	X7	1	VAB1+	Litz Wire	Valve VAB1	-	
764	R36	Waste/Water Distributor	X7	2	VAB1-	Litz Wire	Valve VAB1	-	
765		Cable R38 (fixed to Valve)							
766	R38	Waste/Water Distributor	X9	1	VWD1+	Litz Wire	Valve VWD1 Abl.	-	
767	R38	Waste/Water Distributor	X9	2	VWD1-	Litz Wire	Valve VWD1 Abl.	-	
768		Cable R39 (fixed to Valve)							
769	R39	Waste/Water Distributor	X10	1	VWD2+	Litz Wire	Valve VWD2 Abl.	-	
770	R39	Waste/Water Distributor	X10	2	VWD2-	Litz Wire	Valve VWD2 Abl.	-	
771		Cable R310 (fixed to Valve)							
772	R 310	Waste/Water Distributor	X11	1	VWB1+	Litz Wire	Valve VWB1	-	
773	R 310	Waste/Water Distributor	X11	2	VWB1-	Litz Wire	Valve VWB1	-	
774		Cable R311 (fixed to Valve)							
775	R311	Waste/Water Distributor	X12	1	VWS1+	Litz Wire	Valve VWS1	-	
776	R311	Waste/Water Distributor	X12	2	VWS1-	Litz Wire	Valve VWS1	-	
777		Cable R312 (Extension)							
778	R312	Waste/Water Distributor	X13	1	VAD1+	Litz Wire	Valve VAD1 (Extension)		1
779	R312	Waste/Water Distributor	X13	2	VAD1-	Litz Wire	Valve VAD1 (Extension)		2
780		Cable R313 (fixed to Valve)							
781	R313	Waste/Water Distributor	X14	1	VAD2+	Litz Wire	Valve VAD2	-	
782	R313	Waste/Water Distributor	X14	2	VAD1-	Litz Wire	Valve VAD2	-	
783		Cable Assy L1							
784	L1	MB	X14	1	(+)24V	Litz Wire	Fan (Extension)	-	1
785	L1	MB	X14	2	GND 24V	Litz Wire	Fan (Extension)	-	2
786	L1	MB	X14	3	(+)24V	Litz Wire	Fan (Extension)	-	3
787	L1	MB	X14	4	GND 24V	Litz Wire	Fan (Extension)	-	4
788		Cable L3							
789	L3	MB	X21	1	(+)24V	Litz Wire	Fan 3	-	
790	L3	MB	X21	2	GND 24V	Litz Wire	Fan 3	-	
791		Cable NT1							
792	NT1	Power Supply Assy	X1	b12	Powerfail	Li AWG16	Dist Keyboard	X10	a6
793	NT1	Power Supply Assy	X1	z14	Powerdown	Li AWG16	Dist Keyboard	X10	a7
794	NT1	Power Supply Assy	X1	b14	Netsync	Li AWG16	Dist Keyboard	X10	b6
795	NT1	Power Supply Assy	X1	b2	(+)15 V	Li AWG16	Voltage Dist	X2	b9
796	NT1	Power Supply Assy	X1	z2	(-)15V	Li AWG16	Voltage Dist	X2	b10
797	NT1	Power Supply Assy	X1	b4	GND1_1	Li AWG16	Dist Keyboard	X10	a1
798	NT1	Power Supply Assy	X1	z4	GND1_2	Li AWG16	Dist Keyboard	X10	a2
799	NT1	Power Supply Assy	X1	b6	GND1_3	Li AWG16	Dist Keyboard	X10	a3
800	NT1	Power Supply Assy	X1	z6	GND1_4	Li AWG16	MB	X13	a7

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
801	NT1	Power Supply Assy	X1	z8	GND1_5	Li AWG16	MB	X13	a8
802	NT1	Power Supply Assy	X1	b8	(+)5,2V_1	Li AWG16	Voltage Dist	X2	a2
803	NT1	Power Supply Assy	X1	b10	(+)5,2V_2	Li AWG16	Voltage Dist	X2	a3
804	NT1	Power Supply Assy	X1	z10	(+)5,2V_3	Li AWG16	Voltage Dist	X2	a4
805	NT1	Power Supply Assy	X1	z12	(+)5,2V_4	Li AWG16	Voltage Dist	X2	a5
806	NT1	Power Supply Assy	X1	b18	(+)15VP_1	Li AWG16	Voltage Dist	X2	b1
807	NT1	Power Supply Assy	X1	z18	(+)15VP_2	Li AWG16	Voltage Dist	X2	a1
808	NT1	Power Supply Assy	X1	b20	(+)15VP_3	Li AWG16	Voltage Dist	X2	b2
809	NT1	Power Supply Assy	X1	z20	(+)15VP_4	Li AWG16	Voltage Dist	X2	b3
810	NT1	Power Supply Assy	X1	z22	(+)15VP_5	Li AWG16	Voltage Dist	X2	b4
811	NT1	Power Supply Assy	X1	b22	GND2_1	Li AWG16	MB	X13	a1
812	NT1	Power Supply Assy	X1	b24	GND2_2	Li AWG16	MB	X13	a2
813	NT1	Power Supply Assy	X1	z24	GND2_3	Li AWG16	MB	X13	a3
814	NT1	Power Supply Assy	X1	b26	GND2_4	Li AWG16	MB	X13	b1
815	NT1	Power Supply Assy	X1	z26	GND2_5	Li AWG16	MB	X13	b2
816	NT1	Power Supply Assy	X1	b28	GND2_6	Li AWG16	MB	X13	b3
817	NT1	Power Supply Assy	X1	z28	GND2_7	Li AWG16	Dist Keyboard	X10	a4
818	NT1	Power Supply Assy	X1	b30	(+)35V_1	Li AWG16	Voltage Dist	X2	b7
819	NT1	Power Supply Assy	X1	z30	(+)35V_2	Li AWG16	Voltage Dist	X2	b8
820	NT1	Power Supply Assy	X1	b32	(+)24V_1	Li AWG16	Voltage Dist	X2	b5
821	NT1	Power Supply Assy	X1	z32	(+)24V_2	Li AWG16	Voltage Dist	X2	b6
822	NT1	Power Supply Assy	X1	z16	Sence +5,2V	Li AWG16	Voltage Dist	X2	a6
823	NT1	Power Supply Assy	X1	b16	Sence GND1	Li AWG16	Dist Keyboard	X10	b4
824	NT1	MB	X13	a6	Ausgleich GND_1	Li AWG16	Dist Keyboard	X10	b5
825	NT1	MB	X13	a4	(+)24V	LiAWG16	Dist Keyboard	X10	a5
826	NT1	MB	X13	b4	STVER_T1+	LiAWG16	Dist Keyboard	X10	a8
827	NT1	MB	X13	b5	STVER_T2-	LiAWG16	Dist Keyboard	X10	b8
828	NT1	MB	X13	b6	STAT_T	LiAWG16	Dist Keyboard	X10	b9
829	NT1	MB	X13	b7	CAN_OUT_HIGH	LiAWG16	Dist Keyboard	X10	a10
830	NT1	MB	X13	b8	CAN_OUT_LOW	LiAWG16	Dist Keyboard	X10	b10
831	NT1	Voltage Dist	X2	a7	(+)5,2V	Li AWG16	Dist Keyboard	X10	b1
832	NT1	Voltage Dist	X2	a8	(+)5,2V	Li AWG16	Dist Keyboard	X10	b2
833	NT1	Voltage Dist	X2	a9	(+)5,2V	Li AWG16	Dist Keyboard	X10	b3
834		Cable PC1							
835	PC1	Dist KeyboardO	X9	1	(+)5,2V	Li AWG22	PC	X10	1
836	PC1	Dist Keyboard	X9	2	(+)5,2V	Li AWG22	PC	X10	2
837	PC1	Dist Keyboard	X9	3	Powerfail	Li AWG22	PC	X10	3
838	PC1	Dist Keyboard	X9	4	Powerdown	Li AWG22	PC	X10	4
839	PC1	Dist Keyboard	X9	5	Netsync	Li AWG22	PC	X10	5
840	PC1	Dist Keyboard	X9	6	GND1	Li AWG22	PC	X10	6

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
841	PC1	Dist Keyboard	X9	7	GND1	Li AWG22	PC	X10	7
842	PC1	Dist Keyboard	X9	8	CAN_OUT_LOW	Li AWG22	PC	X10	8
843	PC1	Dist Keyboard	X9	9	CAN_OUT_HIGH	Li AWG22	PC	X10	9
844	PC1	Dist Keyboard	X9	10	SP1	Li AWG22	PC	X10	10
845	PC1	Dist Keyboard	X9	11	SP2	Li AWG22	PC	X10	11
846		Cable PC3							
847	PC3	PC	X6	1	GND	Litz Wire	Bar Code Reader COM4	X1	1
848	PC3	PC	X6	2	+5V	Litz Wire	Bar Code Reader COM4	X1	2
849	PC3	PC	X6	3	GND	Litz Wire	Bar Code Reader COM4	X1	3
850	PC3	PC	X6	4	TxD	Litz Wire	Bar Code Reader COM4	X1	4
851	PC3	PC	X6	5	RxD	Litz Wire	Bar Code Reader COM4	X1	5
852	PC3	PC	X6	6	+5V	Litz Wire	Bar Code Reader COM4	X1	6
853	PC3	PC	X6	7	CTS	Litz Wire	Bar Code Reader COM4	X1	7
854	PC3	PC	X6	8	RTS	Litz Wire	Bar Code Reader COM4	X1	8
855	PC3	PC	X6	9	NC				
856	PC3	PC	X6	10	NC				
857		Cable PC9							
858	PC9	PC	X3	1	DCD/	Flat	RS 232 COM1	-	1
859	PC9	PC	X3	2	DSR/	Flat	RS 232 COM1	-	6
860	PC9	PC	X3	3	RXD	Flat	RS 232 COM1	-	2
861	PC9	PC	X3	4	RTS/	Flat	RS 232 COM1	-	7
862	PC9	PC	X3	5	TXD	Flat	RS 232 COM1	-	3
863	PC9	PC	X3	6	CTS/	Flat	RS 232 COM1	-	8
864	PC9	PC	X3	7	DTR/	Flat	RS 232 COM1	-	4
865	PC9	PC	X3	8	RJ/	Flat	RS 232 COM1	-	9
866	PC9	PC	X3	9	GND	Flat	RS 232 COM1	-	5
867	PC9	PC	X3	10	N.C.	Flat	RS 232 COM1	-	NC
868		Cable PC10							
869	PC10	PC	X1	1	Strobe/	Flat	Centronics Interface LPT1	-	1
870	PC10	PC	X1	3	D0	Flat	Centronics Interface LPT1	-	2
871	PC10	PC	X1	5	D1	Flat	Centronics Interface LPT1	-	3
872	PC10	PC	X1	7	D2	Flat	Centronics Interface LPT1	-	4
873	PC10	PC	X1	9	D3	Flat	Centronics Interface LPT1	-	5
874	PC10	PC	X1	11	D4	Flat	Centronics Interface LPT1	-	6
875	PC10	PC	X1	13	D5	Flat	Centronics Interface LPT1	-	7
876	PC10	PC	X1	15	D6	Flat	Centronics Interface LPT1	-	8
877	PC10	PC	X1	17	D7	Flat	Centronics Interface LPT1	-	9
878	PC10	PC	X1	19	ACK/	Flat	Centronics Interface LPT1	-	10
879	PC10	PC	X1	21	BUSY	Flat	Centronics Interface LPT1	-	11
880	PC10	PC	X1	23	PE	Flat	Centronics Interface LPT1	-	12

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
881	PC10	PC	X1	25	SELECT	Flat	Centronics Interface LPT1	-	13
882	PC10	PC	X1	2	AUTOFD/	Flat	Centronics Interface LPT1	-	14
883	PC10	PC	X1	4	ERROR/	Flat	Centronics Interface LPT1	-	15
884	PC10	PC	X1	6	INIT	Flat	Centronics Interface LPT1	-	16
885	PC10	PC	X1	8	SELECTIN/	Flat	Centronics Interface LPT1	-	17
886	PC10	PC	X1	10	GND	Flat	Centronics Interface LPT1	-	18
887	PC10	PC	X1	12	GND	Flat	Centronics Interface LPT1	-	19
888	PC10	PC	X1	14	GND	Flat	Centronics Interface LPT1	-	20
889	PC10	PC	X1	16	GND	Flat	Centronics Interface LPT1	-	21
890	PC10	PC	X1	18	GND	Flat	Centronics Interface LPT1	-	22
891	PC10	PC	X1	20	GND	Flat	Centronics Interface LPT1	-	23
892	PC10	PC	X1	22	GND	Flat	Centronics Interface LPT1	-	24
893	PC10	PC	X1	24	GND	Flat	Centronics Interface LPT1	-	25
894	PC10	PC	X1	26	N.C.	Flat	Centronics Interface LPT1	-	NC
895		Cable PC2							
896	PC2	PC	X2	1	Strobe/	Flat	Printer Port LPT2	X1	1
897	PC2	PC	X2	3	D0	Flat	Printer Port LPT2	X1	2
898	PC2	PC	X2	5	D1	Flat	Printer Port LPT2	X1	3
899	PC2	PC	X2	7	D2	Flat	Printer Port LPT2	X1	4
900	PC2	PC	X2	9	D3	Flat	Printer Port LPT2	X1	5
901	PC2	PC	X2	11	D4	Flat	Printer Port LPT2	X1	6
902	PC2	PC	X2	13	D5	Flat	Printer Port LPT2	X1	7
903	PC2	PC	X2	15	D6	Flat	Printer Port LPT2	X1	8
904	PC2	PC	X2	17	D7	Flat	Printer Port LPT2	X1	9
905	PC2	PC	X2	19	ACK/	Flat	Printer Port LPT2	X1	10
906	PC2	PC	X2	21	BUSY	Flat	Printer Port LPT2	X1	11
907	PC2	PC	X2	23	PE	Flat	Printer Port LPT2	X1	12
908	PC2	PC	X2	25	SELECT	Flat	Printer Port LPT2	X1	13
909	PC2	PC	X2	2	AUTOFD/	Flat	Printer Port LPT2	X1	19
910	PC2	PC	X2	4	ERROR/	Flat	Printer Port LPT2	X1	20
911	PC2	PC	X2	6	INIT	Flat	Printer Port LPT2	X1	21
912	PC2	PC	X2	8	SELECTIN/	Flat	Printer Port LPT2	X1	22
913	PC2	PC	X2	10	GND	Flat	Printer Port LPT2	X1	23
914	PC2	PC	X2	12	GND	Flat	Printer Port LPT2	X1	24
915	PC2	PC	X2	14	GND	Flat	Printer Port LPT2	X1	25
916	PC2	PC	X2	16	GND	Flat	Printer Port LPT2	X1	26
917	PC2	PC	X2	18	GND	Flat	Printer Port LPT2	X1	27
918	PC2	PC	X2	20	GND	Flat	Printer Port LPT2	X1	28
919	PC2	PC	X2	22	GND	Flat	Printer Port LPT2	X1	29
920	PC2	PC	X2	24	GND	Flat	Printer Port LPT2	X1	30

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
921	PC2	PC	X2	26	N.C.	Flat	Printer Port LPT2	X1	31
922	PC2	Dist Keyboard	X7	1	Vcc (+)5V		Printer	X1	14
923	PC2	Dist Keyboard	X7	3	Vcc (+)5V		Printer	X1	15
924	PC2	Dist Keyboard	X7	5	Vcc (+)5V		Printer	X1	16
925	PC2	Dist Keyboard	X7	7	Vcc (+)5V		Printer	X1	17
926	PC2	Dist Keyboard	X7	9	Vcc (+)5V		Printer	X1	18
927	PC2	Dist Keyboard	X7	2	GND		Printer	X1	32
928	PC2	Dist Keyboard	X7	4	GND		Printer	X1	33
929	PC2	Dist Keyboard	X7	6	GND		Printer	X1	34
930	PC2	Dist Keyboard	X7	8	GND		Printer	X1	35
931	PC2	Dist Keyboard	X7	10	GND		Printer	X1	36
932		Cable PC8							
933	PC8	PC	X8	1	GND	Flat	Floppy	X1	1
934	PC8	PC	X8	2	RPM/LC	Flat	Floppy	X1	2
935	PC8	PC	X8	3	GND	Flat	Floppy	X1	3
936	PC8	PC	X8	4	N:C.	Flat	Floppy	X1	4
937	PC8	PC	X8	5	GND	Flat	Floppy	X1	5
938	PC8	PC	X8	6	N.C.	Flat	Floppy	X1	6
939	PC8	PC	X8	7	GND	Flat	Floppy	X1	7
940	PC8	PC	X8	8	INDEX/	Flat	Floppy	X1	8
941	PC8	PC	X8	9	GND	Flat	Floppy	X1	9
942	PC8	PC	X8	10	MotorON0,1	Flat	Floppy	X1	16
943	PC8	PC	X8	11	GND	Flat	Floppy	X1	15
944	PC8	PC	X8	12	Drivesel.B/	Flat	Floppy	X1	14
945	PC8	PC	X8	13	GND	Flat	Floppy	X1	13
946	PC8	PC	X8	14	DriveselA/	Flat	Floppy	X1	12
947	PC8	PC	X8	15	GND	Flat	Floppy	X1	11
948	PC8	PC	X8	16	MotorOn2	Flat	Floppy	X1	10
949	PC8	PC	X8	17	EDOut (2,88MB)	Flat	Floppy	X1	17
950	PC8	PC	X8	18	DirContr.	Flat	Floppy	X1	18
951	PC8	PC	X8	19	GND	Flat	Floppy	X1	19
952	PC8	PC	X8	20	Step/	Flat	Floppy	X1	20
953	PC8	PC	X8	21	GND	Flat	Floppy	X1	21
954	PC8	PC	X8	22	WRDATA/	Flat	Floppy	X1	22
955	PC8	PC	X8	23	GND	Flat	Floppy	X1	23
956	PC8	PC	X8	24	WE/	Flat	Floppy	X1	24
957	PC8	PC	X8	25	GND	Flat	Floppy	X1	25
958	PC8	PC	X8	26	Track/	Flat	Floppy	X1	26
959	PC8	PC	X8	27	HDOut (2,88MB)	Flat	Floppy	X1	27
960	PC8	PC	X8	28	WP/	Flat	Floppy	X1	28

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
961	PC8	PC	X8	29	EDOut(2,88)	Flat	Floppy	X1	29
962	PC8	PC	X8	30	RD/	Flat	Floppy	X1	30
963	PC8	PC	X8	31	GND	Flat	Floppy	X1	31
964	PC8	PC	X8	32	Headsel./	Flat	Floppy	X1	32
965	PC8	PC	X8	33	HDOut(2,88MB)	Flat	Floppy	X1	33
966	PC8	PC	X8	34	DSKCHG/	Flat	Floppy	X1	34
967		Cable FL1							
968	FL1	Dist Keyboard	X8	1	(+) 5,2V	Li AWG22	Floppy	X2	1
969	FL1	Dist Keyboard	X8	2	GND	Li AWG22	Floppy	X2	2
970		Cable PC6							
971	PC6	PC	X7	1	DIN	Flat	Dist Keyboard	X1	1
972	PC6	PC	X7	3	LP	Flat	Dist Keyboard	X1	3
973	PC6	PC	X7	5	XSCL	Flat	Dist Keyboard	X1	5
974	PC6	PC	X7	7	UD3	Flat	Dist Keyboard	X1	7
975	PC6	PC	X7	9	UD2	Flat	Dist Keyboard	X1	9
976	PC6	PC	X7	11	UD1	Flat	Dist Keyboard	X1	11
977	PC6	PC	X7	13	UD0	Flat	Dist Keyboard	X1	13
978	PC6	PC	X7	15	LD3	Flat	Dist Keyboard	X1	15
979	PC6	PC	X7	17	LD2	Flat	Dist Keyboard	X1	17
980	PC6	PC	X7	19	LD1	Flat	Dist Keyboard	X1	19
981	PC6	PC	X7	21	LD0	Flat	Dist Keyboard	X1	21
982	PC6	PC	X7	22	ENVEE	Flat	Dist Keyboard	X1	22
983	PC6	PC	X7	23	KBDCLK	Flat	Dist Keyboard	X1	23
984	PC6	PC	X7	24	KBDData	Flat	Dist Keyboard	X1	24
985	PC6	PC	X7	25	M	Flat	Dist Keyboard	X1	25
986	PC6	PC	X7	26	GND	Flat	Dist Keyboard	X1	26
987	PC6	PC	X7	2	GND	Flat	Dist Keyboard	X1	2
988	PC6	PC	X7	4	GND	Flat	Dist Keyboard	X1	4
989	PC6	PC	X7	6	GND	Flat	Dist Keyboard	X1	6
990	PC6	PC	X7	8	GND	Flat	Dist Keyboard	X1	8
991	PC6	PC	X7	10	GND	Flat	Dist Keyboard	X1	10
992	PC6	PC	X7	12	GND	Flat	Dist Keyboard	X1	12
993	PC6	PC	X7	14	GND	Flat	Dist Keyboard	X1	14
994	PC6	PC	X7	16	GND	Flat	Dist Keyboard	X1	16
995	PC6	PC	X7	18	GND	Flat	Dist Keyboard	X1	18
996	PC6	PC	X7	20	GND	Flat	Dist Keyboard	X1	20
997		Cable PC61							
998	PC61	Dist Keyboard	X4	1	DIN	Flexible	Keyboard Assy	X1	1
999	PC61	Dist Keyboard	X4	3	LP	Flexible	Keyboard Assy	X1	3
1000	PC61	Dist Keyboard	X4	5	XSCL	Flexible	Keyboard Assy	X1	5

	Wire	From	Plug	Pin	Signal Name	Cable Type	To	Plug	Pin
1001	PC61	Dist Keyboard	X4	7	UD3	Flexible	Keyboard Assy	X1	7
1002	PC61	Dist Keyboard	X4	9	UD2	Flexible	Keyboard Assy	X1	9
1003	PC61	Dist Keyboard	X4	11	UD1	Flexible	Keyboard Assy	X1	11
1004	PC61	Dist Keyboard	X4	13	UD0	Flexible	Keyboard Assy	X1	13
1005	PC61	Dist Keyboard	X4	15	LD3	Flexible	Keyboard Assy	X1	15
1006	PC61	Dist Keyboard	X4	17	LD2	Flexible	Keyboard Assy	X1	17
1007	PC61	Dist Keyboard	X4	19	LD1	Flexible	Keyboard Assy	X1	19
1008	PC61	Dist Keyboard	X4	21	LD0	Flexible	Keyboard Assy	X1	21
1009	PC61	Dist Keyboard	X4	22	ENVEE	Flexible	Keyboard Assy	X1	22
1010	PC61	Dist Keyboard	X4	23	KBDCLK	Flexible	Keyboard Assy	X1	23
1011	PC61	Dist Keyboard	X4	24	KBDDATA	Flexible	Keyboard Assy	X1	24
1012	PC61	Dist Keyboard	X4	25	M	Flexible	Keyboard Assy	X1	25
1013	PC61	Dist Keyboard	X4	26	VCC K1	Flexible	Keyboard Assy	X1	26
1014	PC61	Dist Keyboard	X4	2	GND K1	Flexible	Keyboard Assy	X1	2
1015	PC61	Dist Keyboard	X4	4	GND K1	Flexible	Keyboard Assy	X1	4
1016	PC61	Dist Keyboard	X4	6	GND K1	Flexible	Keyboard Assy	X1	6
1017	PC61	Dist Keyboard	X4	8	GND K1	Flexible	Keyboard Assy	X1	8
1018	PC61	Dist Keyboard	X4	10	GND K2	Flexible	Keyboard Assy	X1	10
1019	PC61	Dist Keyboard	X4	12	GND K2	Flexible	Keyboard Assy	X1	12
1020	PC61	Dist Keyboard	X4	14	GND K2	Flexible	Keyboard Assy	X1	14
1021	PC61	Dist Keyboard	X4	16	GND K2	Flexible	Keyboard Assy	X1	16
1022	PC61	Dist Keyboard	X4	18	VCC K1	Flexible	Keyboard Assy	X1	18
1023	PC61	Dist Keyboard	X4	20	VCC K1	Flexible	Keyboard Assy	X1	20
1024	PC61	Dist Keyboard	X4	27	VCC K2	Flexible	Keyboard Assy	X1	27
1025	PC61	Dist Keyboard	X4	28	VCC K2	Flexible	Keyboard Assy	X1	28
1026	PC61	Dist Keyboard	X4	29	VCC K2	Flexible	Keyboard Assy	X1	29
1027	PC61	Dist Keyboard	X4	30	VCC K2	Flexible	Keyboard Assy	X1	30
1028		Cable PC62							
1029	PC62	Dist Keyboard	X3 PIN1-3		GND Gerätemasse Flexleitung BNO			X2 PIN1-30	

6 Software

6.1 Communication Protocol ____ 1

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6. Software

6.1 Communication Protocol

In this chapter the **KUST Elecsys 1010 Firmware** and the **CAN-Protocol** will be described.

KUST Elecsys 1010 Firmware:

Description of the software distribution of the Elecsys 1010 Firmware, general definitions, the interface protocols used, and general command processing. The document serves as an interface between the OEM Master and the different modules. The module commands are described in separate DOS TUS Manual.

CAN-Protocol:

Description of the software-driver-library-module for the communication between micro-controllers 80C196KC by way of a serial network, the Intel-Chip 82526, realized by so-called FullCANs.

6.2 Service Software

6.2.1 Introduction

When starting/booting the Service Software diskette you will see the following menu:

```
              ELECSYS 1010
SERVICE SOFTWARE  3.0 September 1999
 for operator software V 2.01 and 3.0

     1 - Start Service Software
     2 - Save database to disk
     3 - Artificial media test
     4 - EN 45001
     5 - Restore database from disk
     6 - Install OEM Master
     7 - Return to DOS


Select a function:_
```

With option **1** the Service Software can be started.

With option **2** a backup copy of the Elecsys D:\ drive can be created. (See chapter 6.2.8).

With option **3** the Artifical Media Test Software will be started. The Artifical Media Test is explained in detail in chapter 6.2.9.

With option **4** the EN 45001 Test Software can be started. Further information is given in the EN 45001 Training and in a separate manual.

With option **5** a backup copy can be restored to the Elecsys D:\ drive. (See chapter 6.2.8).

With option **6** the OEM Master PCB can be installed. (See chapter 6.4).

With option **7** the Software returns to the DOS prompt.

6.2.2 General

This Service Software is available on a 3.5" diskette. The Service Software starts automatically if the instrument is switched on with the Service-Software diskette inserted in the diskette-drive. The software can be operated using the Elecsys 1010 keyboard. The screen layout is shown below.

Screen layout :

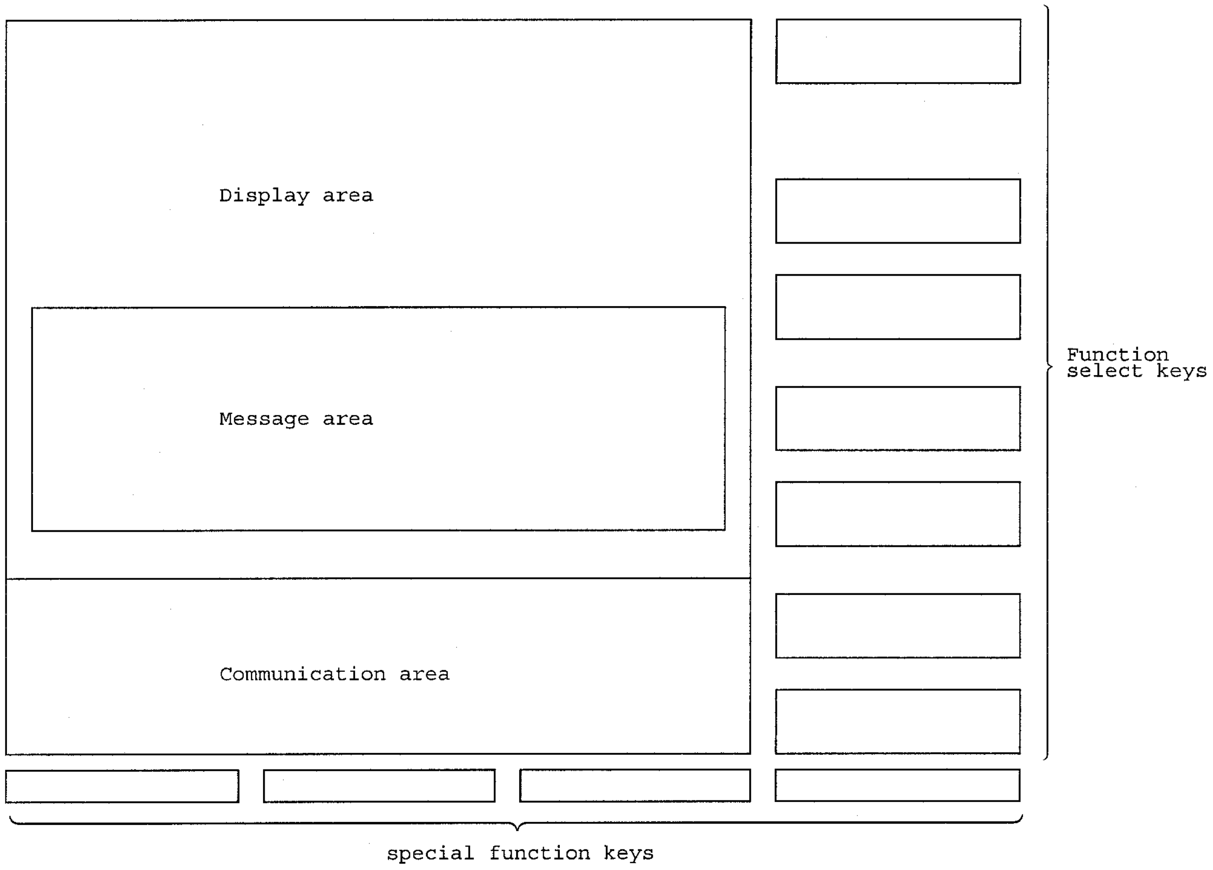
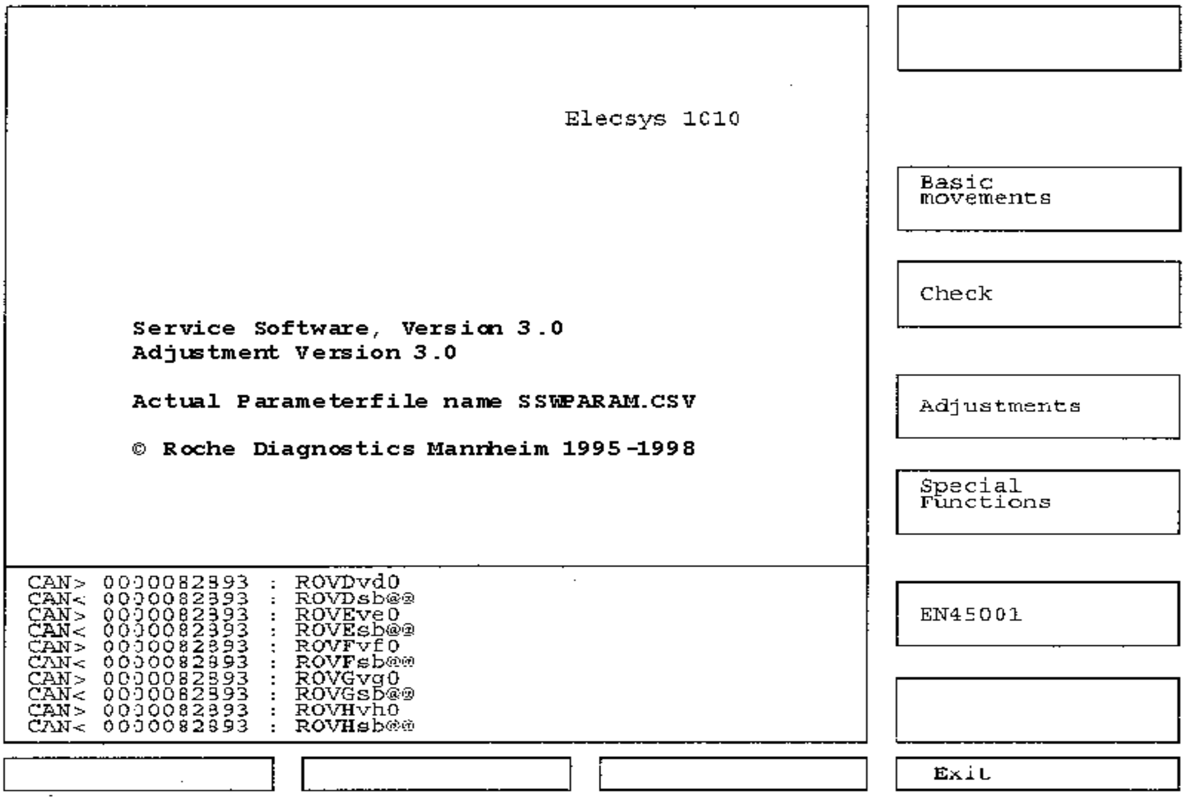

Display area
Message area
Communication area
Function select keys
special function keys

Fig. 6-2-1

6.2.3 Main Menu



Elecsys 1010

Service Software, Version 3.0
Adjustment Version 3.0

Actual Parameterfile name SSWPARAM.CSV

© Roche Diagnostics Mannheim 1995-1998

```
CAN> 0000082893 : ROVDvd0
CAN< 0000082893 : ROVDsb@@
CAN> 0000082893 : ROVEve0
CAN< 0000082893 : ROVEsb@@
CAN> 0000082893 : ROVFvf0
CAN< 0000082893 : ROVFsb@@
CAN> 0000082893 : ROVGvg0
CAN< 0000082893 : ROVGsb@@
CAN> 0000082893 : ROVHvh0
CAN< 0000082893 : ROVHsb@@
```

Fig. 6-2-2

After starting the Service Software the following steps are done:

- Testing the horizontal moving parameters of the MFAs. If parameters are returned with an error, a warning message appears on the screen and the needles should be removed to prevent mechanical damage.
- An initialisation-sequence is sent to the modules.
- The main menu appears on the screen. You see the copyright message, the version number of the Service Software and the version number of the corresponding adjustment parameter file.

The adjustment parameter file (sswparam.csv) may be updated from time-to-time and depends on the instrument configuration and the operating Software Version. Changes will be done using the inbuilt editor function. Information about any changes will be communicated via service news.

From the Main Menu is it possible to select a submenu by pressing the corresponding key or to leave the program by pressing the **Exit** key.

After pressing the **Exit** key in the main menu all devices will move to their init-positions,
all temperature controllers are set to off and then the programm ends.

Warning:

When using this Service Software make sure to have an updated version, which is valid for the given instrument serial number having the correct adjustment parameter file (sswparam.csv) attached. Adjustments done with the wrong Service Software Version may lead to malfunction of the instrument and may cause wrong measurements!!

6.2.3.1 Basic Movements Menu

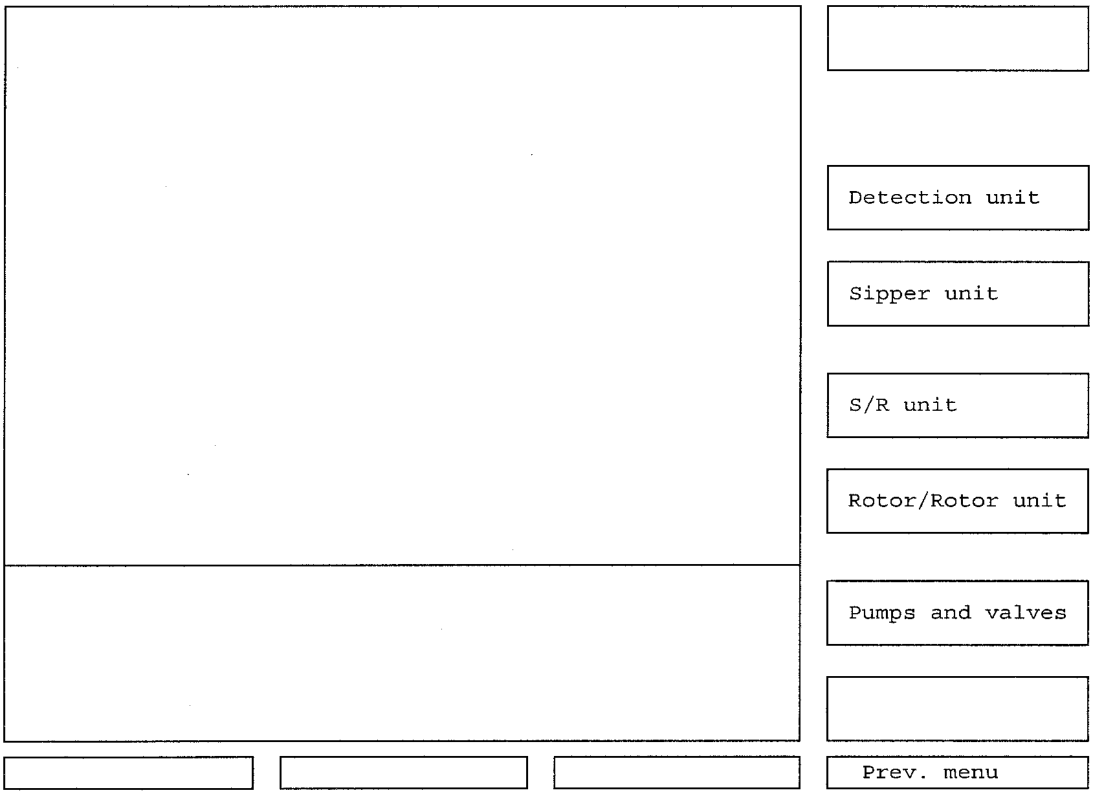

Detection unit
Sipper unit
S/R unit
Rotor/Rotor unit
Pumps and valves
Prev. menu

Fig. 6-2-3

This is the Basic Movements Menu. The different functions can be selected by pressing the corresponding keys on the right hand side.
When the **Prev. menu** key is pressed, the program returns to the Main Menu.

6.2.3.2 Check Menu

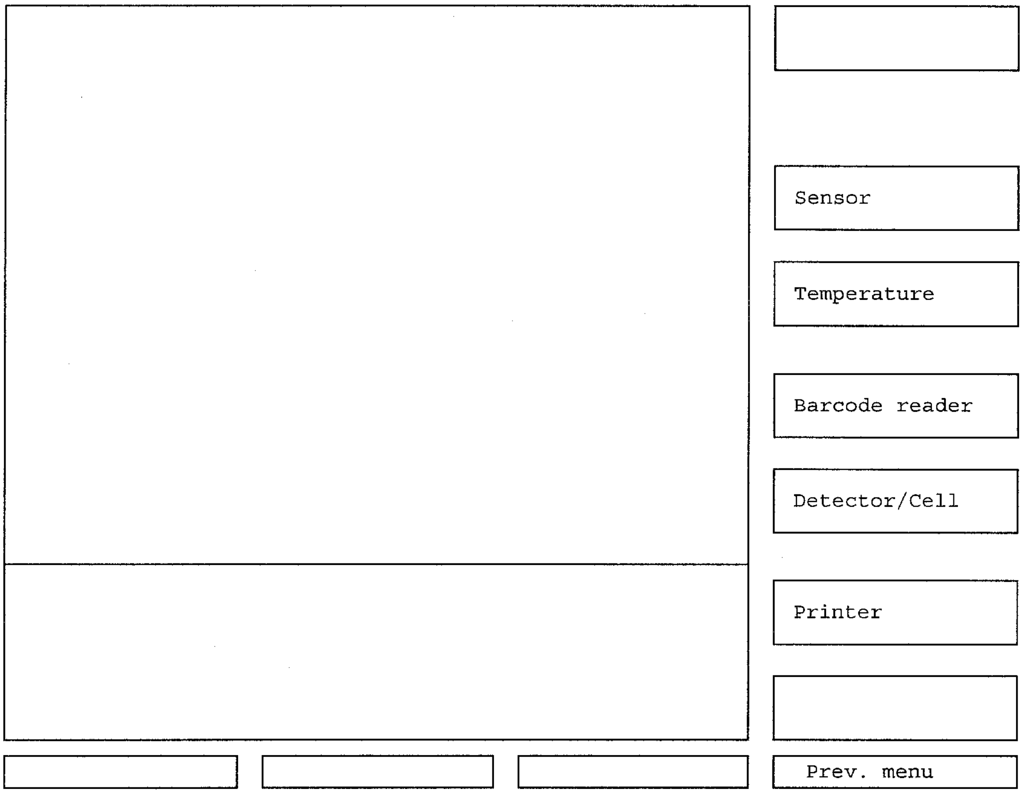

Sensor
Temperature
Barcode reader
Detector/Cell
Printer
Prev. menu

Fig. 6-2-4

This is the Check Menu.The different functions can be selected by pressing the corresponding keys on the right hand side.
When the **Prev. menu** key is pressed, the program returns to the Main Menu.

6.2.3.3 Adjustments Menu

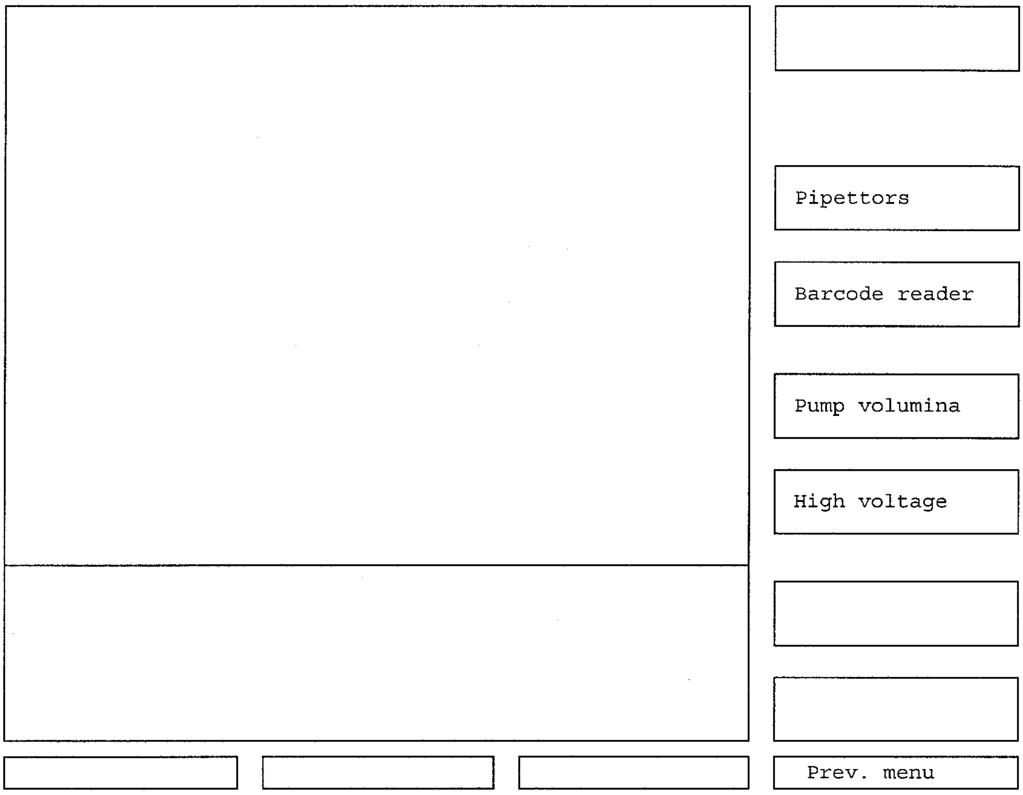

Pipettors
Barcode reader
Pump volumina
High voltage
Prev. menu

Fig. 6-2-5

This is the Adjustments Menu.The different adjustment procedures can be selected by pressing the corresponding keys on the right hand side.
When the **Prev. menu** key is pressed, the program returns to the Main Menu.

6.2.3.4 Special Functions Menu

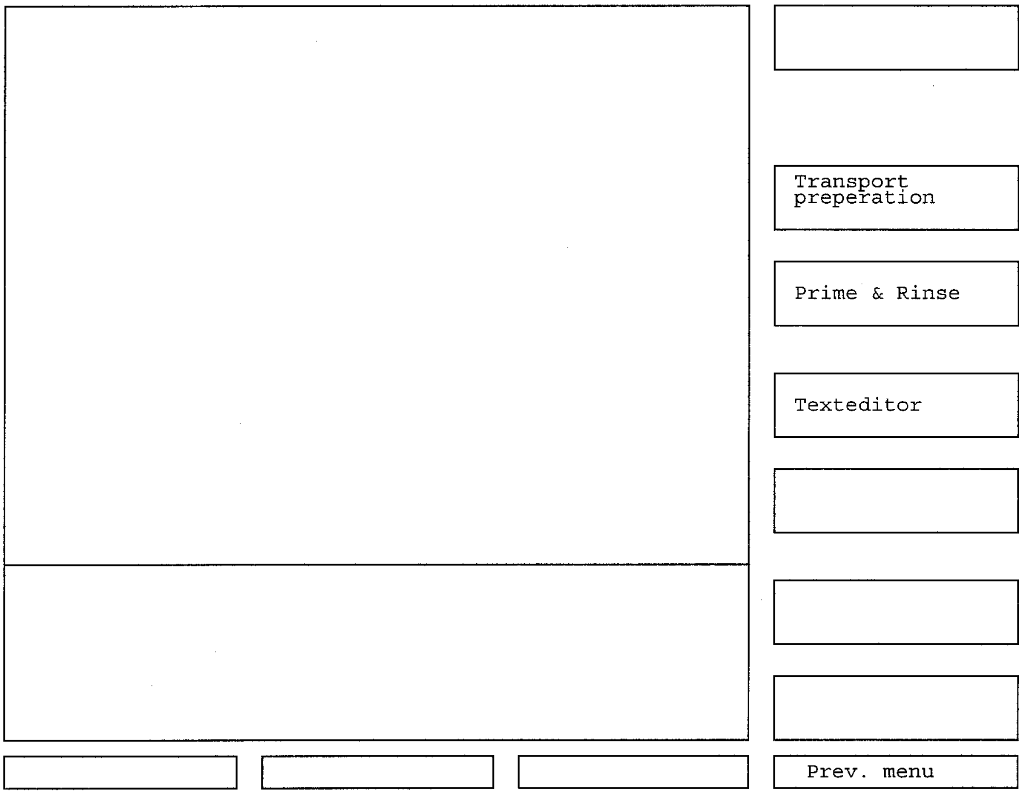
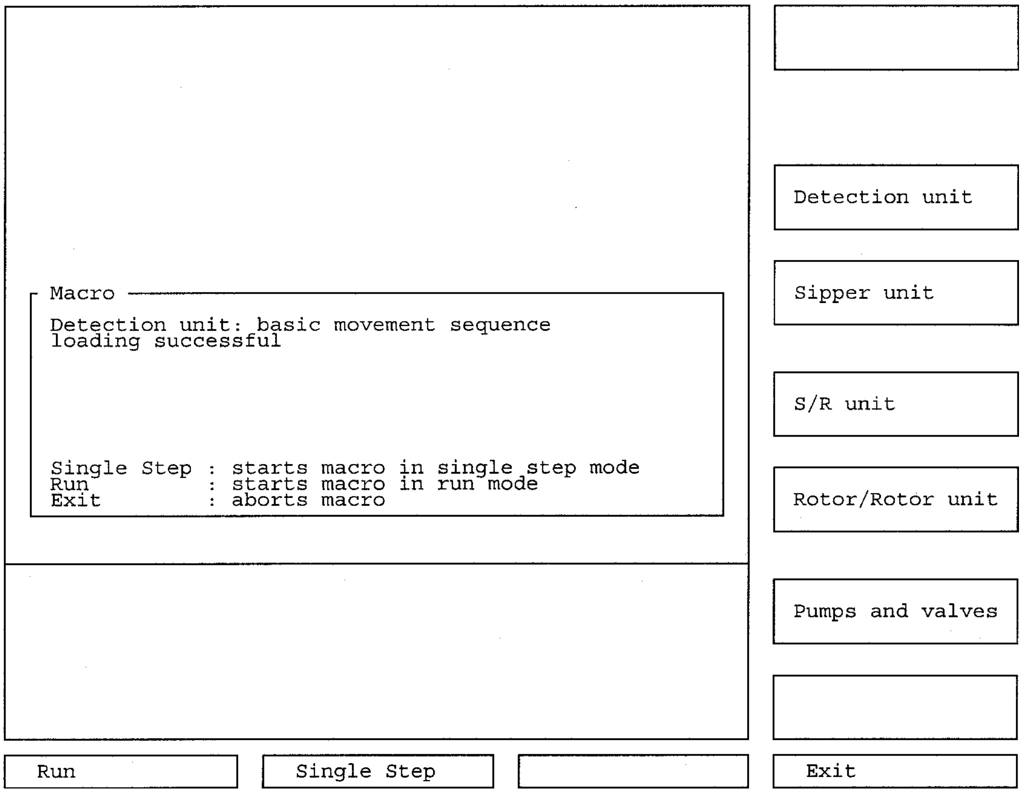

Transport preperation
Prime & Rinse
Texteditor
Prev. menu

Fig. 6-2-6

This is the Special Functions Menu.The different functions can be selected by pressing the corresponding keys on the right hand side.
When the **Prev. menu** key is pressed, the program returns to the Main Menu.

6.2.4 Basic movement / Detailed description

6.2.4.1 Basic movement ⇨ detection unit


Detection unit
Sipper unit
S/R unit
Rotor/Rotor unit
Pumps and valves
Run
Single Step
Exit
Macro

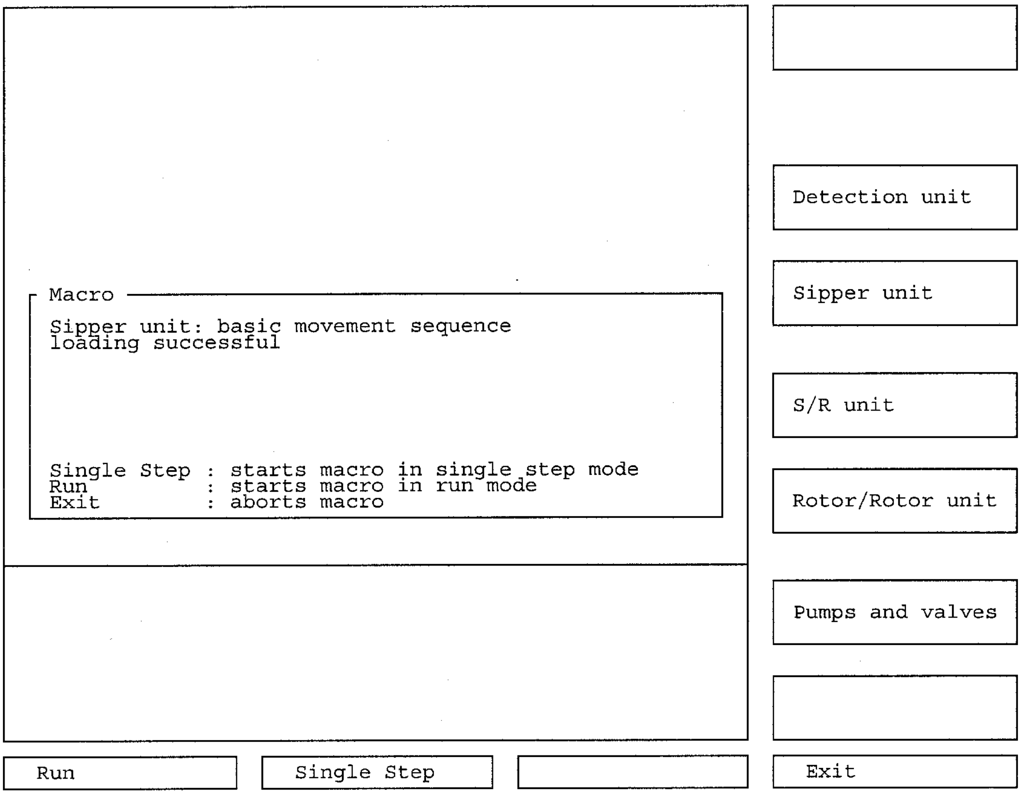
```
Detection unit: basic movement sequence
loading successful

Single Step : starts macro in single step mode
Run         : starts macro in run mode
Exit        : aborts macro
```

Fig. 6-2-8

If the function "Detection unit" is selected in the basic movement menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards is it possible either to start the macro in "Single-Step" or "Run" mode or to cancel the function by pressing the **Exit** key.

Following steps will be performed:
- move magnet to cell
- delay 5 sec.
- move magnet back to home

6.2.4.2 Basic movement ⇨ Sipper unit



```
Macro
Sipper unit: basic movement sequence
loading successful

Single Step : starts macro in single step mode
Run         : starts macro in run mode
Exit        : aborts macro
```

Detection unit
Sipper unit
S/R unit
Rotor/Rotor unit
Pumps and valves
Run
Single Step
Exit

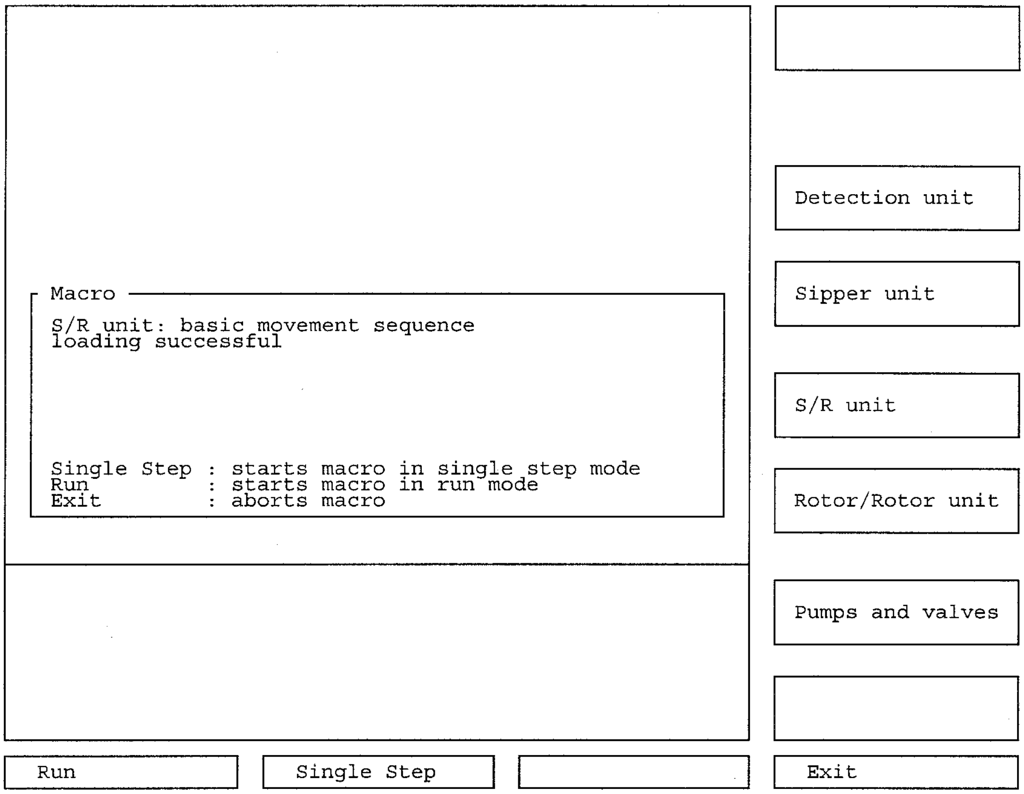
Fig. 6-2-9

If the function "Sipper unit" is selected in the basic movement menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards is it possible either to start the macro in "Single-Step" or "Run-Mode" or to cancel the function by pressing the **Exit** key.

Note:
Place CleanCell in Block 1

Following steps will be performed:
- init
- move sipper arm to CleanCell
- aspirate 1 ml
- discharge 1 ml

6.2.4.3 Basic movements ⇨ Sample / Reagent unit (S/R Unit)



```
Macro
S/R unit: basic movement sequence
loading successful

Single Step : starts macro in single step mode
Run         : starts macro in run mode
Exit        : aborts macro
```

Fig. 6-2-10

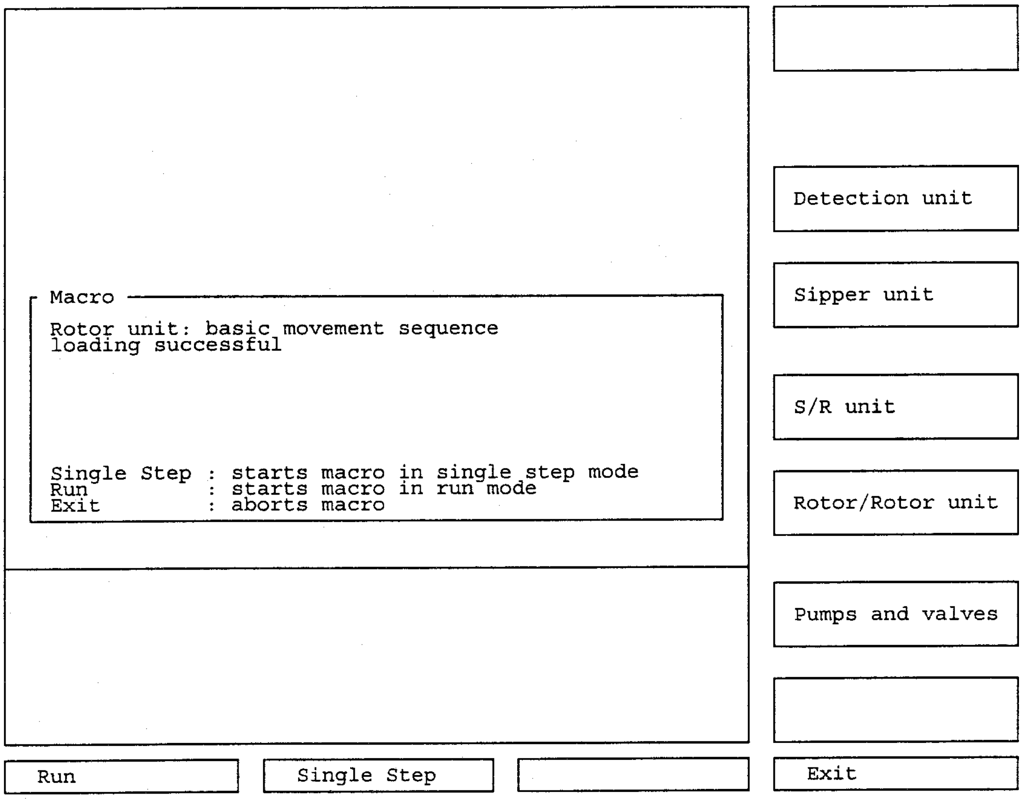
If the function ”S/R unit” is selected in the basic movement menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards is it possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

Note:

place ProCell and CleanCell in Block 1
place a BlankCell rackpack in rotor segment A
place vessels in incubator segment A
place a standard cup filled with ProCell in pos. 43

Following steps will be performed:
- init
- prime sipper unit
- prime cell with ProCell
- pipette from position 43 into incubator segment A pos. 1 with LLD
- pipette from rackpack A (BCR1) into incubator segment A pos. 1 with LLD
- same in position 2, 3, 4, 5 and 6 of incubator

6.2.4.4 Basic movement ⇨ Rotor / Rotor unit



```
Macro
Rotor unit: basic movement sequence
loading successful

Single Step : starts macro in single step mode
Run         : starts macro in run mode
Exit        : aborts macro
```

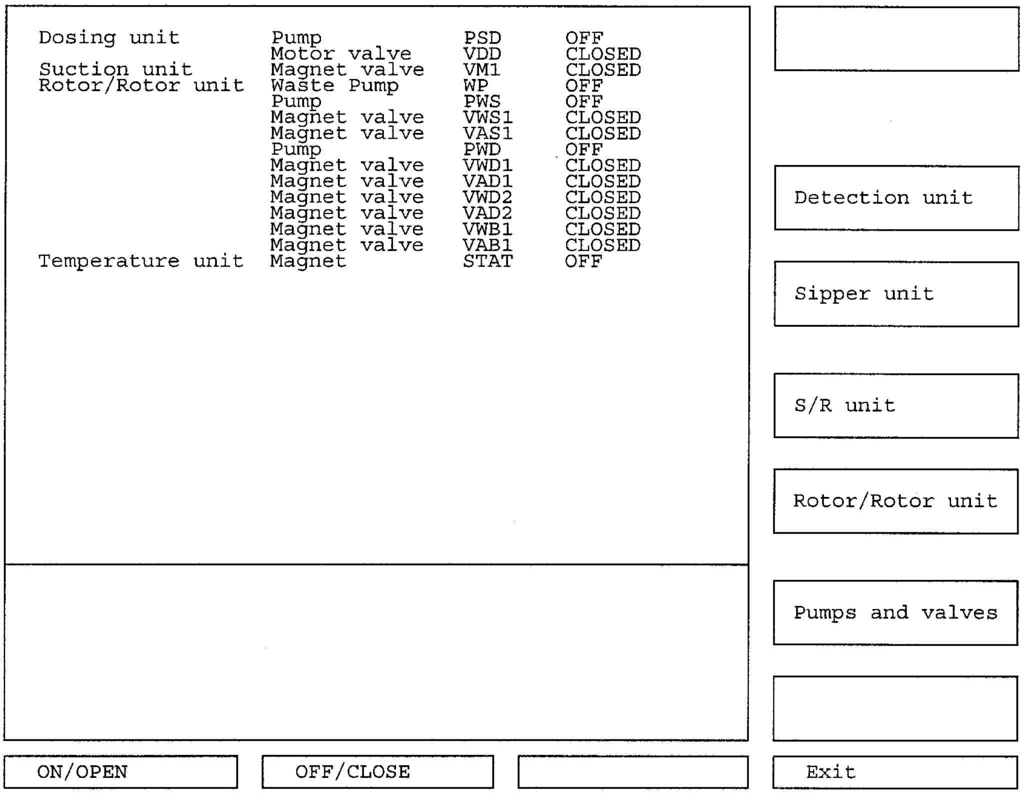
Detection unit
Sipper unit
S/R unit
Rotor/Rotor unit
Pumps and valves
Run
Single Step
Exit

Fig. 6-2-11

If the function ”Rotor/Rotor unit” is selected in the basic movement menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards it is possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

Following steps will be performed:
- init
- S/R rotor turns
- incubation rotor turns
- init

6.2.4.5 Basic movements ⇨ Pumps & Valves



```
Dosing unit        Pump          PSD    OFF
                   Motor valve   VDD    CLOSED
Suction unit       Magnet valve  VM1    CLOSED
Rotor/Rotor unit   Waste Pump    WP     OFF
                   Pump          PWS    OFF
                   Magnet valve  VWS1   CLOSED
                   Magnet valve  VAS1   CLOSED
                   Pump          PWD    OFF
                   Magnet valve  VWD1   CLOSED
                   Magnet valve  VAD1   CLOSED
                   Magnet valve  VWD2   CLOSED
                   Magnet valve  VAD2   CLOSED
                   Magnet valve  VWB1   CLOSED
                   Magnet valve  VAB1   CLOSED
Temperature unit   Magnet        STAT   OFF
```

Fig. 6-2-12

If the function ”Pumps & Valves” is selected in the basic movement menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards is it possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key

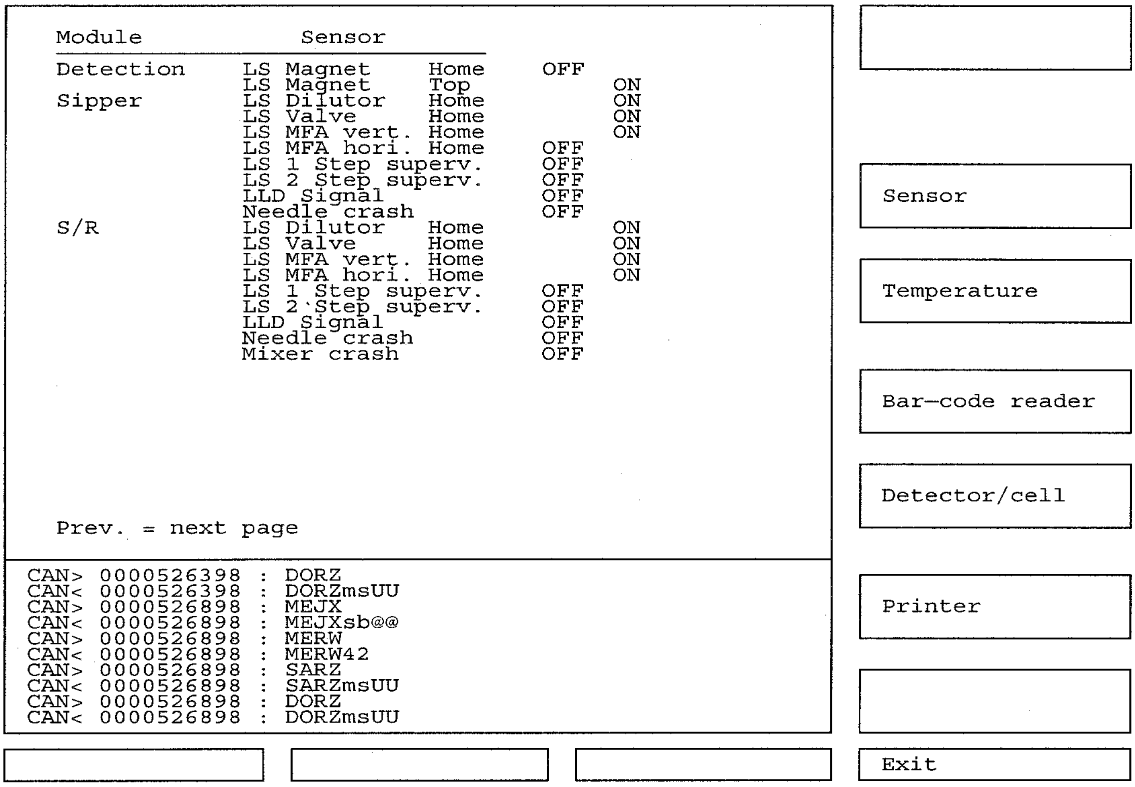
You can either open/close the valves or switch on/off the pumps with the corresponding softkeys **ON/OPEN** and **OFF/CLOSE.**
The pumps PSD, PWS and PWD will be switched on for 3 seconds and go off automatically.
The waste pump stays on and has to be switched off with the **OFF**-key.
The pumps and the valves are activated independently! Please ensure that the corresponding valve is opened before a pump is activated.

Note:

Make sure that all pumps are OFF and the valves are CLOSED before you exit.

6.2.5 Check / Detailed description

6.2.5.1 Check ⇨ Sensors (page 1)



```
Module          Sensor
Detection       LS Magnet    Home     OFF
                LS Magnet    Top           ON
Sipper          LS Dilutor   Home          ON
                LS Valve     Home          ON
                LS MFA vert. Home          ON
                LS MFA hori. Home     OFF
                LS 1 Step superv.     OFF
                LS 2 Step superv.     OFF
                LLD Signal            OFF
                Needle crash          OFF
S/R             LS Dilutor   Home          ON
                LS Valve     Home          ON
                LS MFA vert. Home          ON
                LS MFA hori. Home          ON
                LS 1 Step superv.     OFF
                LS 2`Step superv.     OFF
                LLD Signal            OFF
                Needle crash          OFF
                Mixer crash           OFF

Prev. = next page

CAN> 0000526398 : DORZ
CAN< 0000526398 : DORZmsUU
CAN> 0000526898 : MEJX
CAN< 0000526898 : MEJXsb@@
CAN> 0000526898 : MERW
CAN< 0000526898 : MERW42
CAN> 0000526898 : SARZ
CAN< 0000526898 : SARZmsUU
CAN> 0000526898 : DORZ
CAN< 0000526898 : DORZmsUU
```

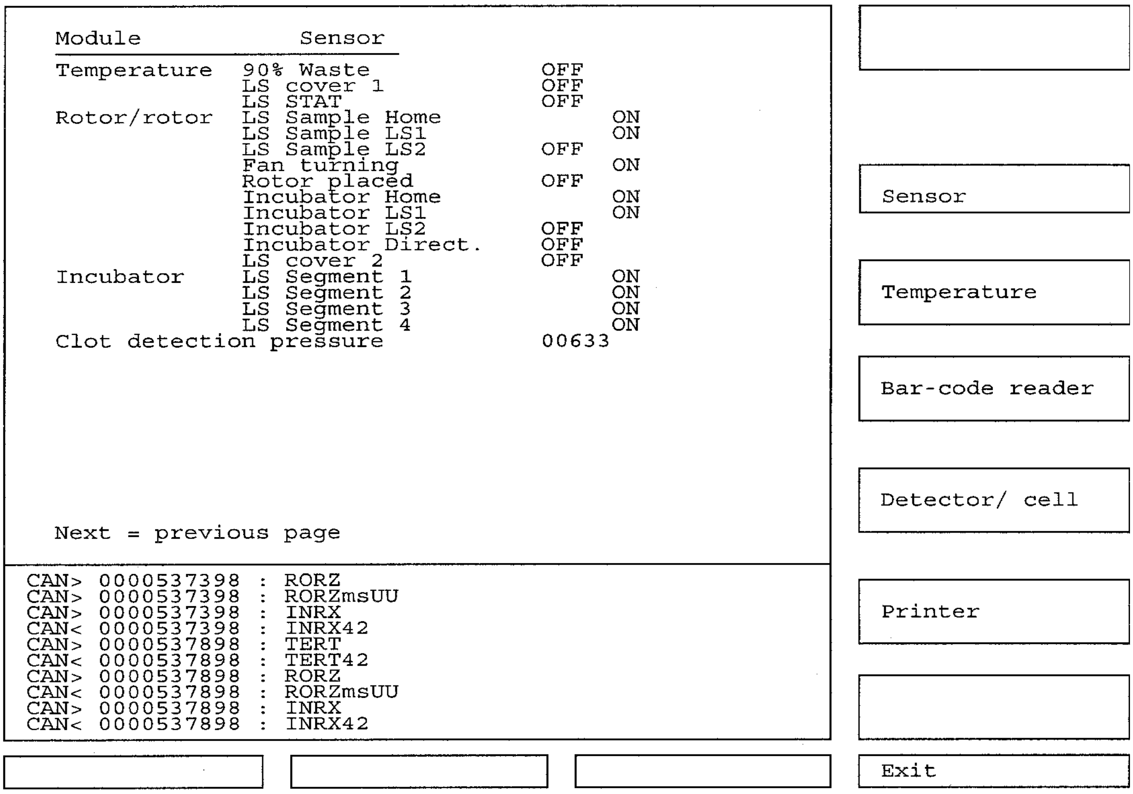
Fig. 6-2-13

After selection of the ”Sensor” function in the check-menu, the first group of sensors (Detection Unit, Sipper Unit and S/R Unit) is continuously checked and the status of each sensor is shown on the screen.
In order to access the second group of sensors (Temperature, Rotor/Rotor, Incubator and Clot detection) press the **prev** key.

During this function all motors are switched currentless and the individual sensors can be activated by moving the mechanical parts of the corresponding sensor plates.

If the **Exit** key is activated, the program will terminate the ”Check” function, reset the modules and return to the Main Menu.

6.2.5.2 Check ⇨ Sensors (page 2)



```
Module              Sensor
Temperature    90% Waste                OFF
               LS cover 1               OFF
               LS STAT                  OFF
Rotor/rotor    LS Sample Home                ON
               LS Sample LS1                 ON
               LS Sample LS2            OFF
               Fan turning                   ON
               Rotor placed             OFF
               Incubator Home                ON
               Incubator LS1                 ON
               Incubator LS2            OFF
               Incubator Direct.        OFF
               LS cover 2               OFF
Incubator      LS Segment 1                  ON
               LS Segment 2                  ON
               LS Segment 3                  ON
               LS Segment 4                  ON
Clot detection pressure                 00633

Next = previous page
```

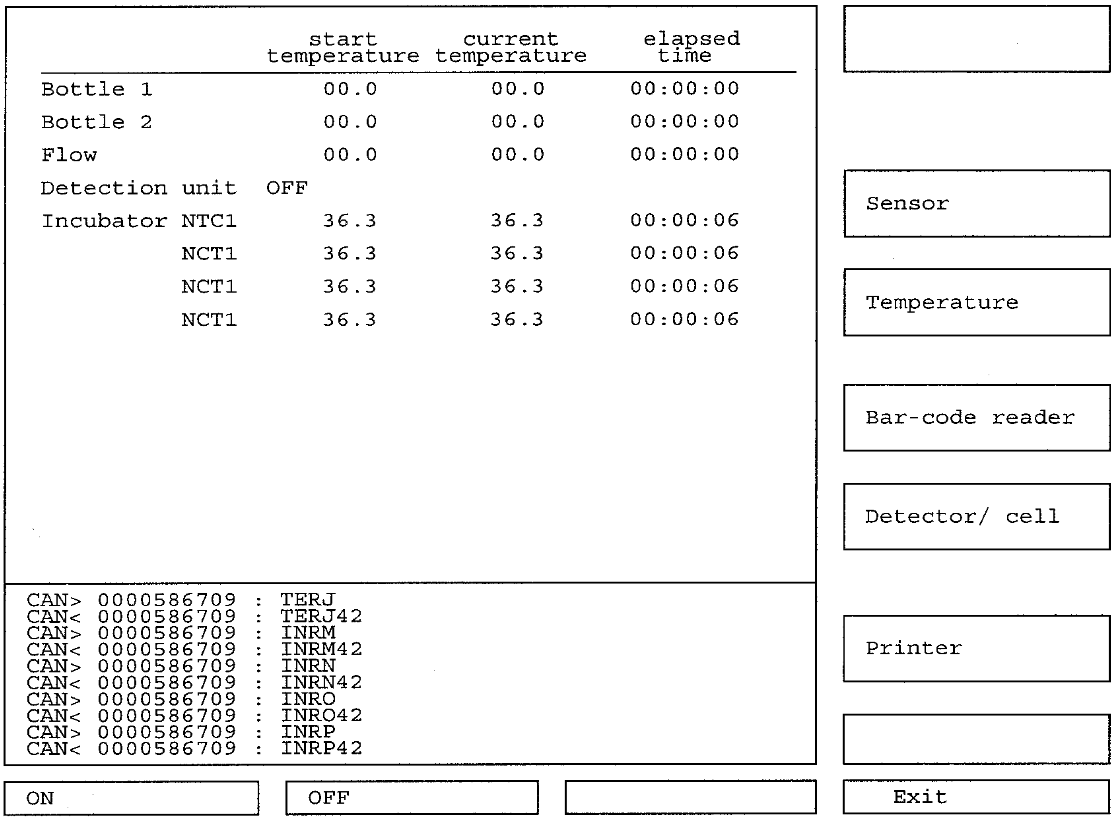
```
CAN> 0000537398 : RORZ
CAN> 0000537398 : RORZmsUU
CAN> 0000537398 : INRX
CAN< 0000537398 : INRX42
CAN> 0000537898 : TERT
CAN< 0000537898 : TERT42
CAN> 0000537898 : RORZ
CAN< 0000537898 : RORZmsUU
CAN> 0000537898 : INRX
CAN< 0000537898 : INRX42
```

Fig. 6-2-14

After pressing the **prev** key in the check sensor function the second page of sensor status appears on the screen. With the **next** key it is possible to return to the first page.

If the **Exit** key is activated, the program will terminate the ”Check” function, reset the modules and return to the Main Menu.

6.2.5.3 Check ⇨ Temperature



```
                         start       current       elapsed
                     temperature temperature        time
Bottle 1                 00.0        00.0        00:00:00
Bottle 2                 00.0        00.0        00:00:00
Flow                     00.0        00.0        00:00:00
Detection unit  OFF
Incubator NTC1           36.3        36.3        00:00:06
          NCT1           36.3        36.3        00:00:06
          NCT1           36.3        36.3        00:00:06
          NCT1           36.3        36.3        00:00:06
```

```
CAN> 0000586709 : TERJ
CAN< 0000586709 : TERJ42
CAN> 0000586709 : INRM
CAN< 0000586709 : INRM42
CAN> 0000586709 : INRN
CAN< 0000586709 : INRN42
CAN> 0000586709 : INRO
CAN< 0000586709 : INRO42
CAN> 0000586709 : INRP
CAN< 0000586709 : INRP42
```

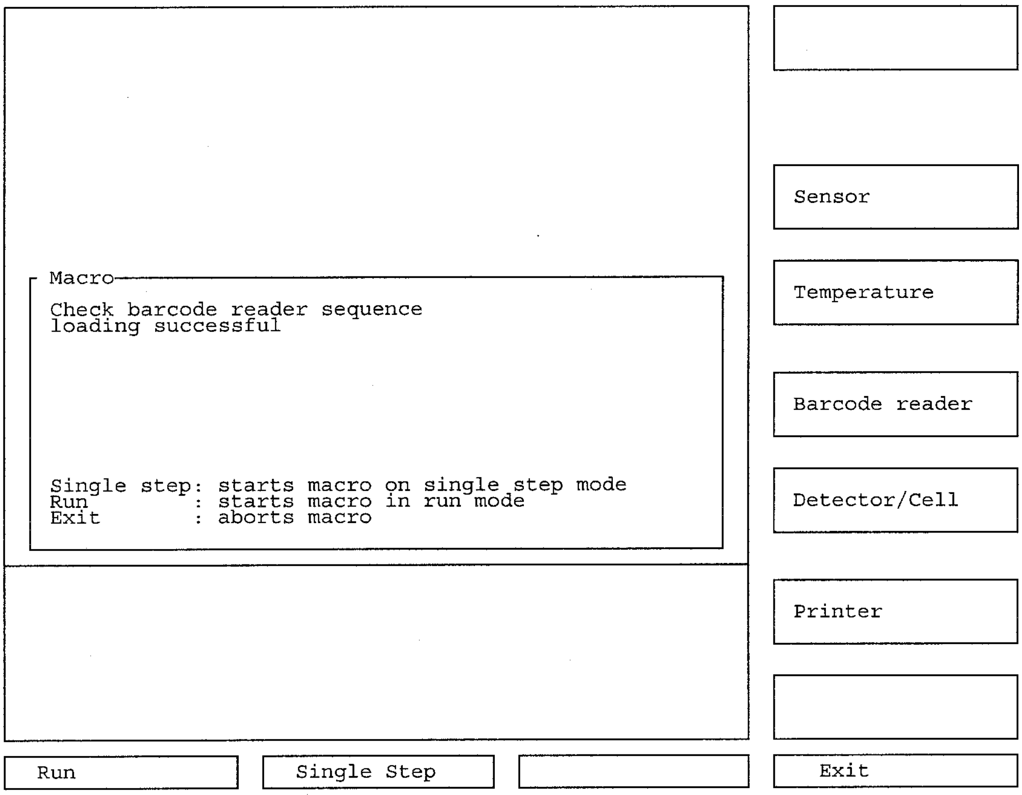
Fig. 6-2-15

After selection of the ”Temperature” function in the check-menu the status of the temperature-controllers is shown on the screen.
By pressing the **Down** or **Up** key, each temperature cirquit can be selected seperately. With the **On** or **Off** key it is possible to activate or disactivate the temperature-control of the corresponding cirquit..
After activating the temperature control, the initial temperature (start temperature), the actual temperature as well as the elapsed time (power on time) for each cirquit is displayed on the screen.
Pressing the **Exit** key leaves the function and returns to the Main Menu.

Note:

> **If you leave this function the temperature-controllers keep their last status. This allows to perform other functions while the instrument is heating up.**

6.2.5.4 Check ⇨ Barcode reader



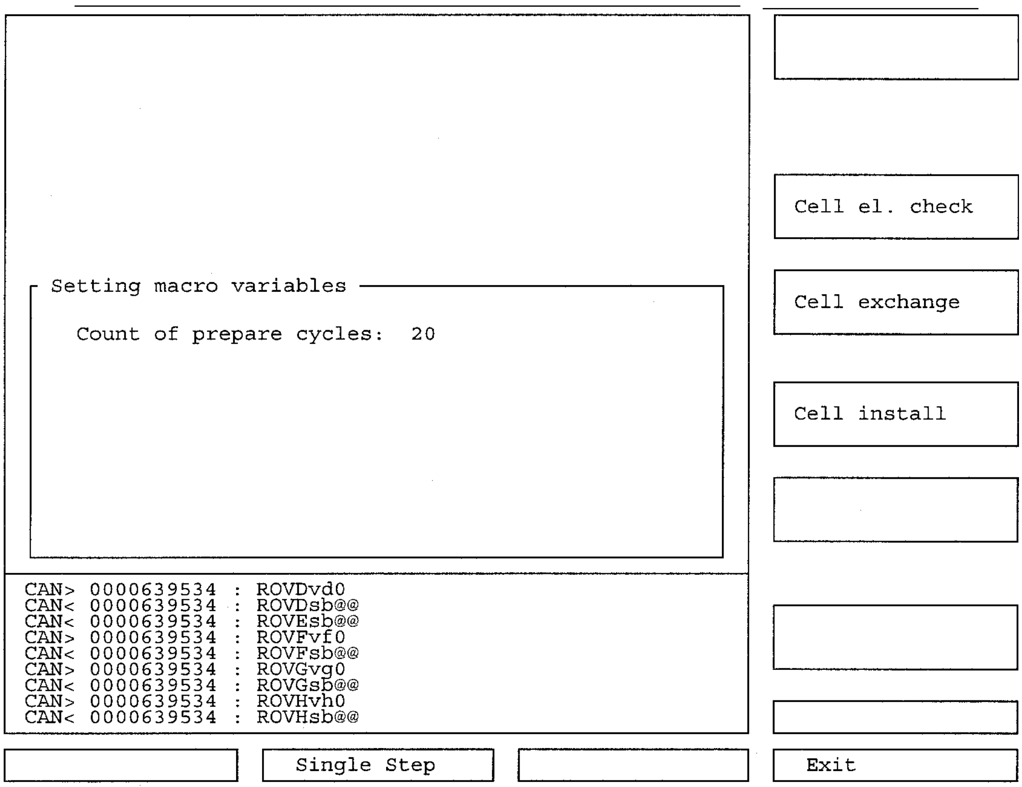
```
Macro
Check barcode reader sequence
loading successful

Single step: starts macro on single step mode
Run        : starts macro in run mode
Exit       : aborts macro
```

Fig. 6-2-16

If the function ”Barcode reader” is selected in the Check menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards is it possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

After pressing the **Run** key the sample rotor is now currentless and the Barcode reader is activated. Insert the special barcode-card (with the tilt angle) into segment ”A” and turn it in front of the Barcode reader until the light goes off. In the communication area of the screen you will see the information that is read by the Barcode reader. According to the shown angle value the Barcode reader has to be adjusted.
The angle can be aligned with the adjustment screw at the suspension of the Barcode reader.
The adjustment should be done by setting the value to +00.

6.2.5.5 Check ⇨ Detector/Cell menu



Setting macro variables

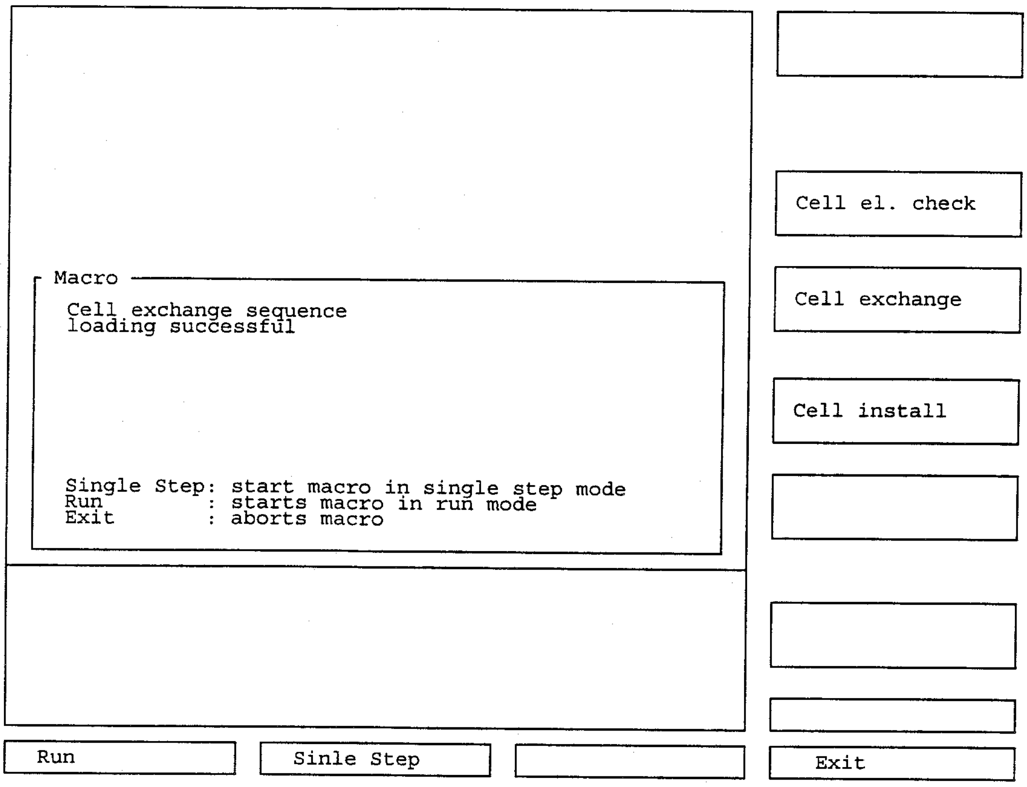
Count of prepare cycles: 20

```
CAN> 0000639534 : ROVDvd0
CAN< 0000639534 : ROVDsb@@
CAN< 0000639534 : ROVEsb@@
CAN> 0000639534 : ROVFvf0
CAN< 0000639534 : ROVFsb@@
CAN> 0000639534 : ROVGvg0
CAN< 0000639534 : ROVGsb@@
CAN> 0000639534 : ROVHvh0
CAN< 0000639534 : ROVHsb@@
```

Fig. 6-2-17

This is the Detector/Cell Menu. The different functions can be selected by pressing the corresponding keys on the right hand side.
When the **Exit** key is pressed, the program returns to the Main Menu.

6.2.5.6 Check ⇨ Detector/Cell ⇨ Cell exchange



```
Macro
 Cell exchange sequence
 loading successful

 Single Step: start macro in single step mode
 Run        : starts macro in run mode
 Exit       : aborts macro
```

Fig. 6-2-19

If the function ”Cell exchange” is selected in the Detector/Cell menu, the corresponding macro is loaded from diskette into the memory (RAM).Afterwards is it possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

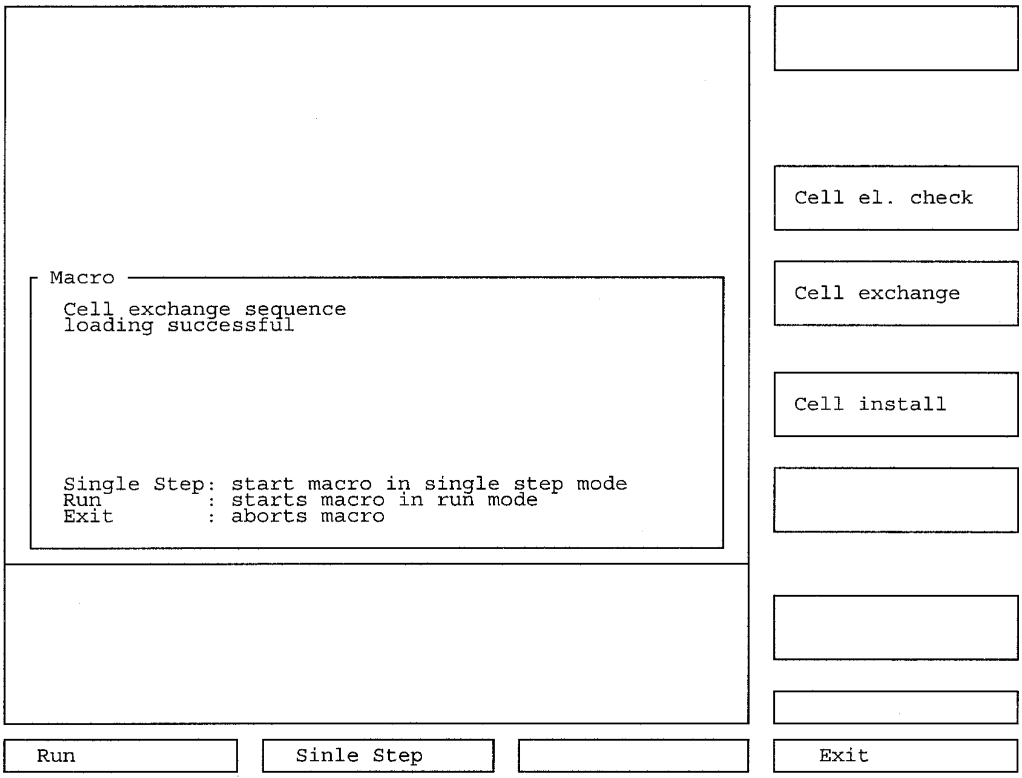
After pressing the **Run** key a dialog window opens and you can enter a desinfection time in seconds. This should be minimum 1200 sec (20 minutes)

Note:

place ProCell and CleanCell in Block 1

Following action is done
- Prime cell with clean cell
- Start disinfection time
- Note: Set disinfection time to 1 for quick start
- clean cell with water from washing station WS1
- prime cell with air

6.2.5.7 Check ⇨ Detector/Cell ⇨ Cell install



```
Macro
  Cell exchange sequence
  loading successful

  Single Step: start macro in single step mode
  Run        : starts macro in run mode
  Exit       : aborts macro
```

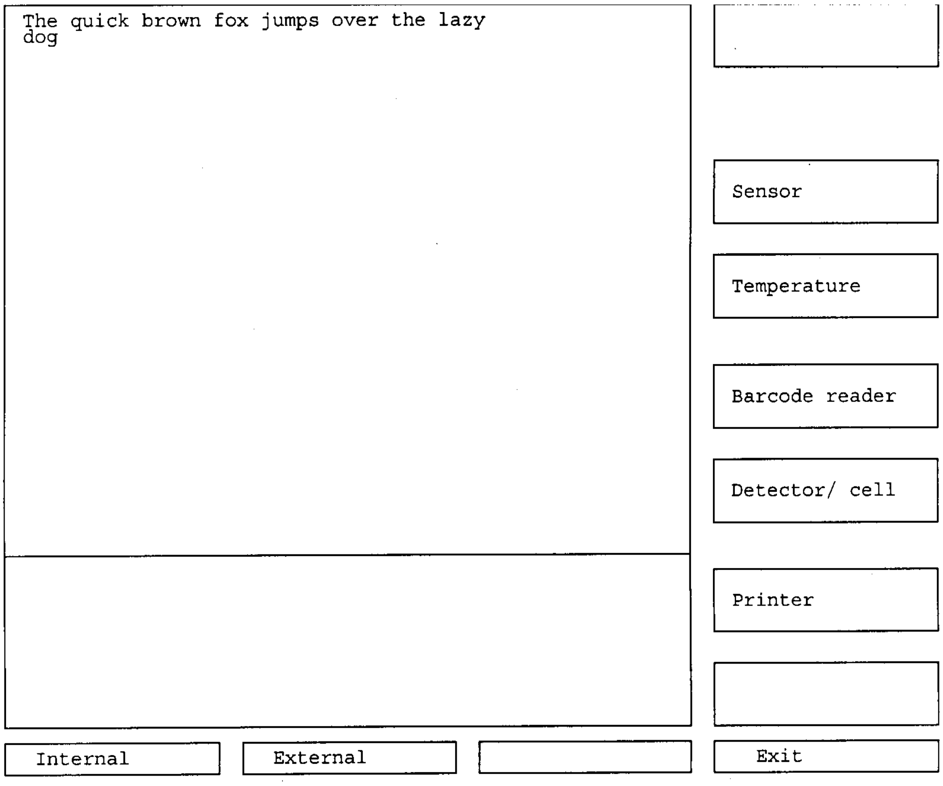
Fig. 6-2-20

If the function ”Cell install” is selected in the Detector/Cell menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards is it possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

The following action is done:
- Prime system
- performs 30 times measuring cell preperation
- Prime cell with pro cell again (final cycle)

Note:
place ProCell and CleanCell in Block 1

6.2.5.8 Check ⇨ Printer



The quick brown fox jumps over the lazy dog

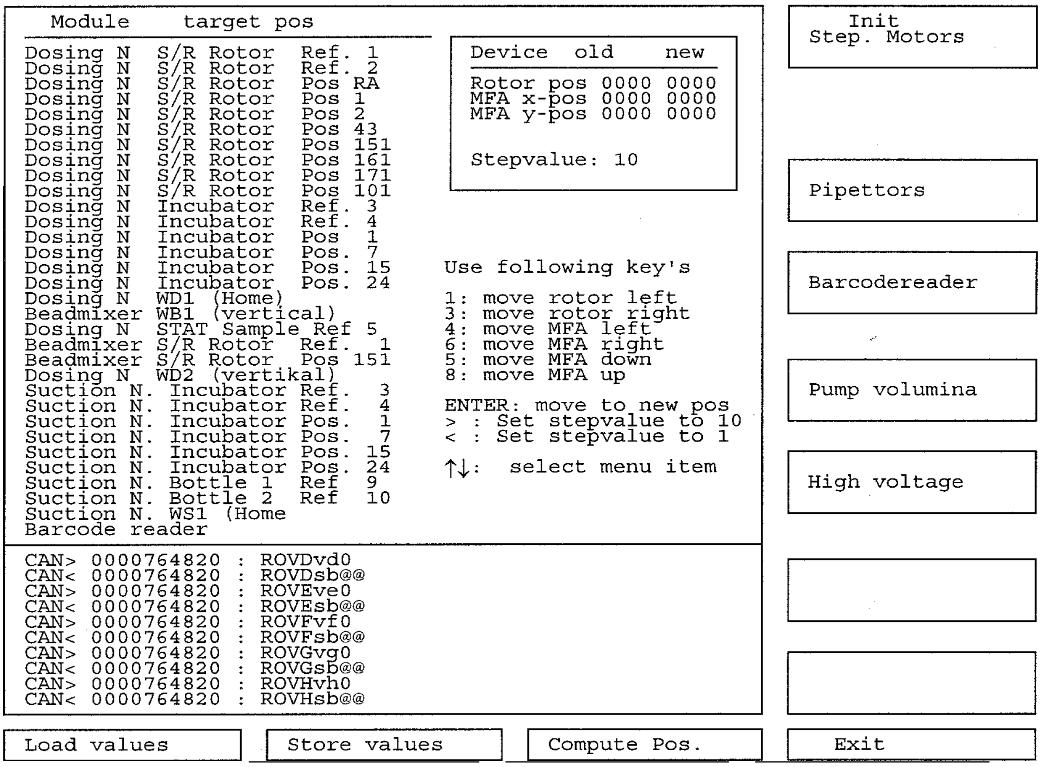
Sensor
Temperature
Barcode reader
Detector/ cell
Printer
Internal
External
Exit

Fig. 6-2-21

After selection of the ”Printer” function in the check-menu, a message can be printed.
Pressing the ”Internal” key prints the message on the internal printer.
Pressing the ”External” key prints the message on the external printer.
If the **Exit** key is pressed, the program will return to the Main Menu.

6.2.6 Adjustments / Detailed description

6.2.6.1Adjustments ⇨ Pipettors



```
Module     target pos

Dosing N   S/R Rotor   Ref. 1
Dosing N   S/R Rotor   Ref. 2
Dosing N   S/R Rotor   Pos RA
Dosing N   S/R Rotor   Pos 1
Dosing N   S/R Rotor   Pos 2
Dosing N   S/R Rotor   Pos 43
Dosing N   S/R Rotor   Pos 151
Dosing N   S/R Rotor   Pos 161
Dosing N   S/R Rotor   Pos 171
Dosing N   S/R Rotor   Pos 101
Dosing N   Incubator   Ref. 3
Dosing N   Incubator   Ref. 4
Dosing N   Incubator   Pos  1
Dosing N   Incubator   Pos. 7
Dosing N   Incubator   Pos. 15
Dosing N   Incubator   Pos. 24
Dosing N   WD1 (Home)
Beadmixer  WB1 (vertical)
Dosing N   STAT Sample Ref 5
Beadmixer  S/R Rotor   Ref.  1
Beadmixer  S/R Rotor   Pos 151
Dosing N   WD2 (vertikal)
Suction N. Incubator Ref.  3
Suction N. Incubator Ref.  4
Suction N. Incubator Pos.  1
Suction N. Incubator Pos.  7
Suction N. Incubator Pos. 15
Suction N. Incubator Pos. 24
Suction N. Bottle 1  Ref  9
Suction N. Bottle 2  Ref  10
Suction N. WS1 (Home
Barcode reader

Device    old    new

Rotor pos 0000  0000
MFA x-pos 0000  0000
MFA y-pos 0000  0000

Stepvalue: 10

Use following key's

1: move rotor left
3: move rotor right
4: move MFA left
6: move MFA right
5: move MFA down
8: move MFA up

ENTER: move to new pos
> : Set stepvalue to 10
< : Set stepvalue to 1

↑↓:  select menu item

CAN> 0000764820 : ROVDvd0
CAN< 0000764820 : ROVDsb@@
CAN> 0000764820 : ROVEve0
CAN< 0000764820 : ROVEsb@@
CAN> 0000764820 : ROVFvf0
CAN< 0000764820 : ROVFsb@@
CAN> 0000764820 : ROVGvg0
CAN< 0000764820 : ROVGsb@@
CAN> 0000764820 : ROVHvh0
CAN< 0000764820 : ROVHsb@@
```

Fig. 6-2-22

After selection of the “Pipettors” function in the adjustment-menu the current adjustment values are loaded from the modules into the memory (RAM) and the above screen appears.

With the cursor **Up** and **Down** keys the required adjustment can be selected from the list.
The actual value(s) of the highlighted adjustment is (are) displayed in the window on the right side of the screen. In the column ”old” the currently stored values are given and in the column ”new” the actual adjusted values. Directly after selecting the function, ”old” and ”new” values are the same.When the instrument is readjusted, the values in the column ”new” will change.
If there is no value in the ”new” position column, it is possible to move the device but the new position is not stored.

Pressing the **Enter** key moves the devices to the ”new” position (with backlash compensation). If this position needs to be corrected, the devices can be moved with the following keys:

cw		MFA up		ccw
		8		
MFA left	4	5	6	MFA right
		MFA down		
rotor left	1		3	rotor right

With the left and right cursor keys the step value can be set to 1 or 10.
(The actual step value is displayed in the window)

After finishing the adjustments, it is neccessary to press the **Compute pos**. key in order to calculate the offset positions. (the program will load the ”sswparam.csv” file and compensate the actual values) The corrected values can be stored by pressing the **Store values** key.The adjustment values will be stored to the modules and in addition to the diskette (if a file name is entered). If you intend to store the values to the modules only, enter 0000000.ADJ as filename.

Note:

This function also stores all other parameters from the sswadjust.csv file except the high voltage.

With the **Load values** key it is possible to read all parameters from the adjustment diskette into the memory.

Pressing the **Exit** key leaves this function.

Sample/Reagent Rotor

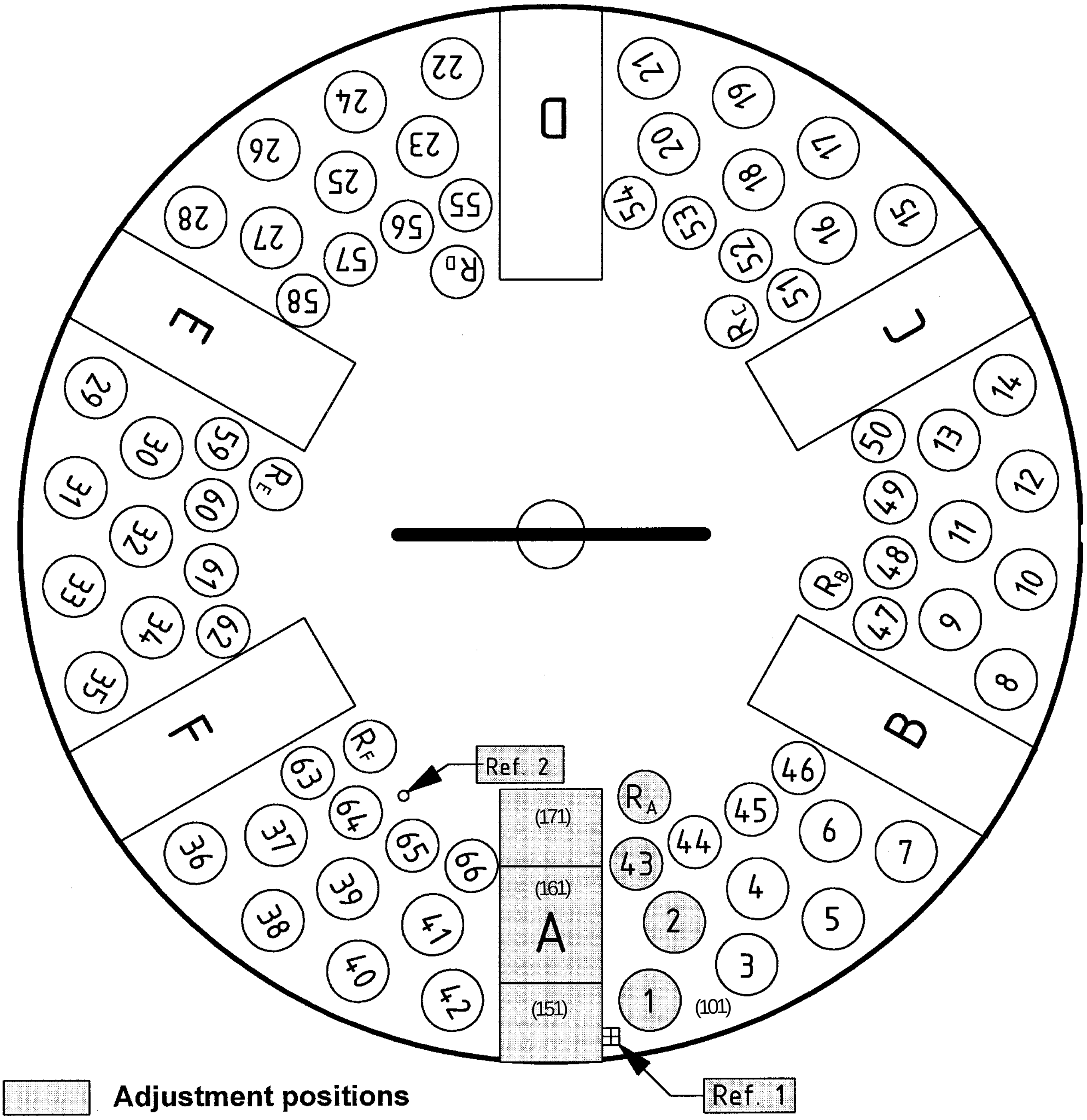

A
B
C
D
E
F
(171)
(161)
(151)
(101)
Ref. 1
Ref. 2
R
A
R
B
R
C
R
D
R
E
R
F
▨ Adjustment positions

Fig. 6-2-23

Adjustment positions on the S/R Rotor:

names referred to SSW	names in above pic.	Remarks
Dosing N S/R Rotor Ref. 1	Dosing needle Ref. 1	adjust hor. and vert.
Dosing N S/R Rotor Ref. 2	Dosing needle Ref. 2	adjust hor. and vert.
Dosing N S/R Rotor Pos. RA	Dosing needle on (RA)	adjust hor.
Dosing N S/R Rotor Pos. 1	Dosing needle on ①	adjust hor.
Dosing N S/R Rotor Pos. 2	Dosing needle on ②	adjust hor.
Dosing N S/R Rotor Pos. 43	Dosing needle on ㊸	adjust hor.
Dosing N S/R Rotor Pos. 151	Dosing needle on 🄰	adjust hor.
Dosing N S/R Rotor Pos. 161	Dosing needle on 🄰	adjust hor.
Dosing N S/R Rotor Pos. 171	Dosing needle on 🄰	adjust hor.
Dosing N S/R Rotor Pos.101	Dosing needle on ①	adjust hor.

Note:

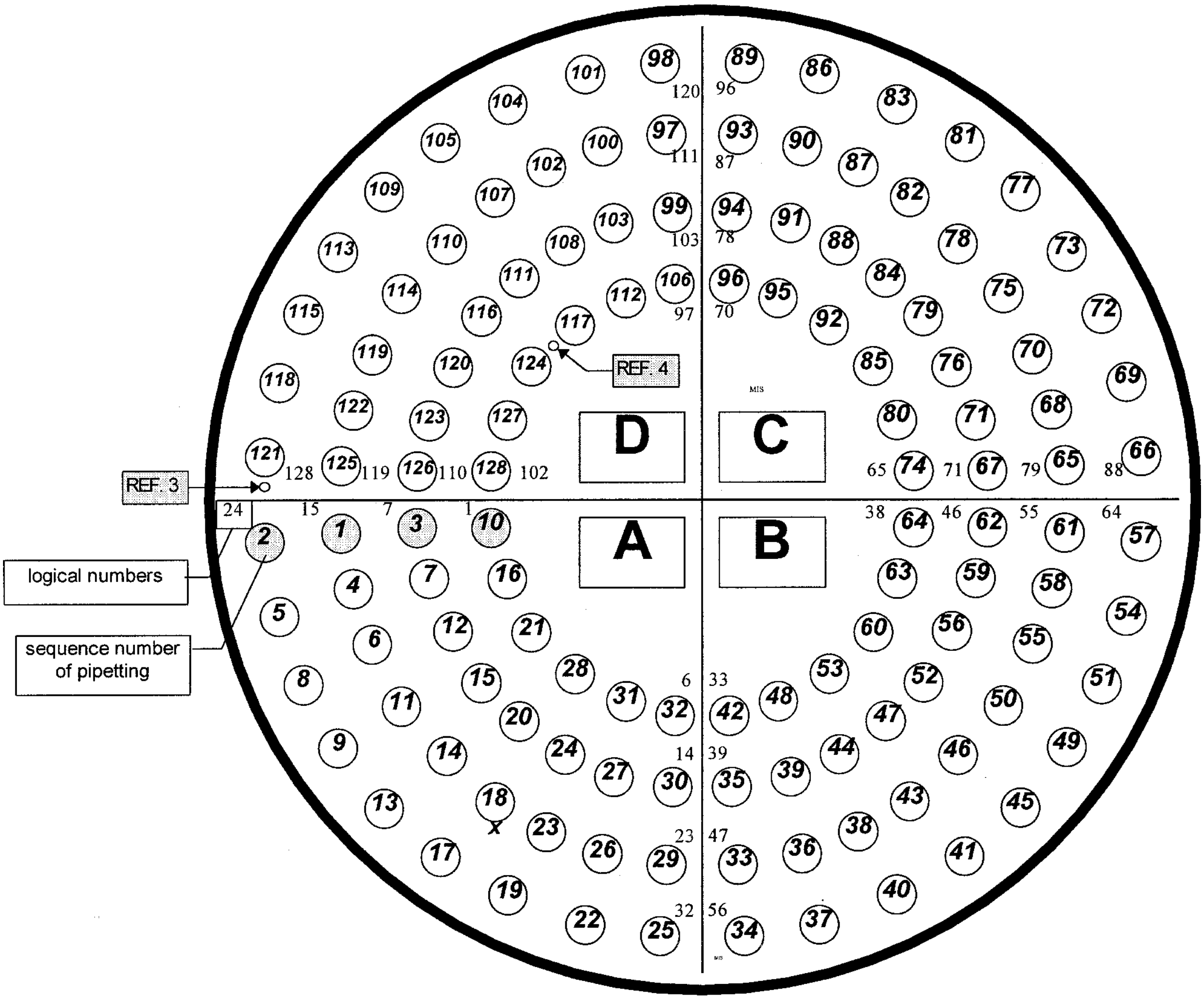
Pos. 151 is the micro particle bottle in segment A
Pos. 161 is the reagent 1 bottle in segment A
Pos. 171 is the reagent 2 bottle in segment A
Pos. 101 is equal to Pos. 1 but you have to place a calibrator vial instead of a tube

Barcode Reader:

Reading Position:

Place “Refpos” adjustment card in position A. If the rotor is adjusted correctly, the light of the BCR turns off and “Refpos” is displayed in the communication area of the screen.

ELECSYS 1010 Incubator


REF. 4
REF. 3
logical numbers
sequence number of pipetting
D
C
A
B

▨ : **Adjustment positions**

Fig. 6-2-24

Adjustment points on the incubation rotor:

names referred to SSW	names in above pic.	Remarks
Dosing N Incubator Ref. 3	Dosing needle Ref. 3	adjust hor. and vert.
Dosing N Incubator Ref. 4	Dosing needle Ref. 4	adjust hor. and vert.
Dosing N Incubator Pos. 1	Dosing needle on ⑩	adjust hor.
Dosing N Incubator Pos. 7	Dosing needle on ③	adjust hor.
Dosing N Incubator Pos. 15	Dosing needle on ①	adjust hor.
Dosing N Incubator Pos. 24	Dosing needle on ②	adjust hor.
Suction N. Incubator Ref. 3	Suction needle on Ref. 3	adjust hor. and vert.
Suction N. Incubator Ref. 4	Suction needleon Ref. 4	adjust hor. and vert.
Suction N. Incubator Pos. 1	Suction needle on ⑩	adjust hor.
Suction N. Incubator Pos. 7	Suction needle on ③	adjust hor.
Suction N. Incubator Pos. 15	Suction needle on ①	adjust hor.
Suction N. Incubator Pos. 24	Suction needle on ②	adjust hor.

Other positions

Dosing N WD1 (Home)	Dosing needle on WD1	adjust hor.
Dosing N WD2 (vertical)	Dosing needle on WD2	adjust hor. and vert.
Dosing N WB1 (vertical)	Dosing needle on WB1	adjust hor. and vert.
Dosing N STAT Sample Ref. 5	Dosing needle on STAT Pos. S1	adjust hor. and vert.
Beadmixer WB1 (vertical)	Beadmixer on WB1	adjust hor. and vert.
Beadmixer S/R Rotor Ref. 1	Beadmixer on Ref. 1	adjust hor. and vert.
Beadmixer S/R Rotor Pos. 151	Beadmixer on $\boxed{A}$	adjust hor.

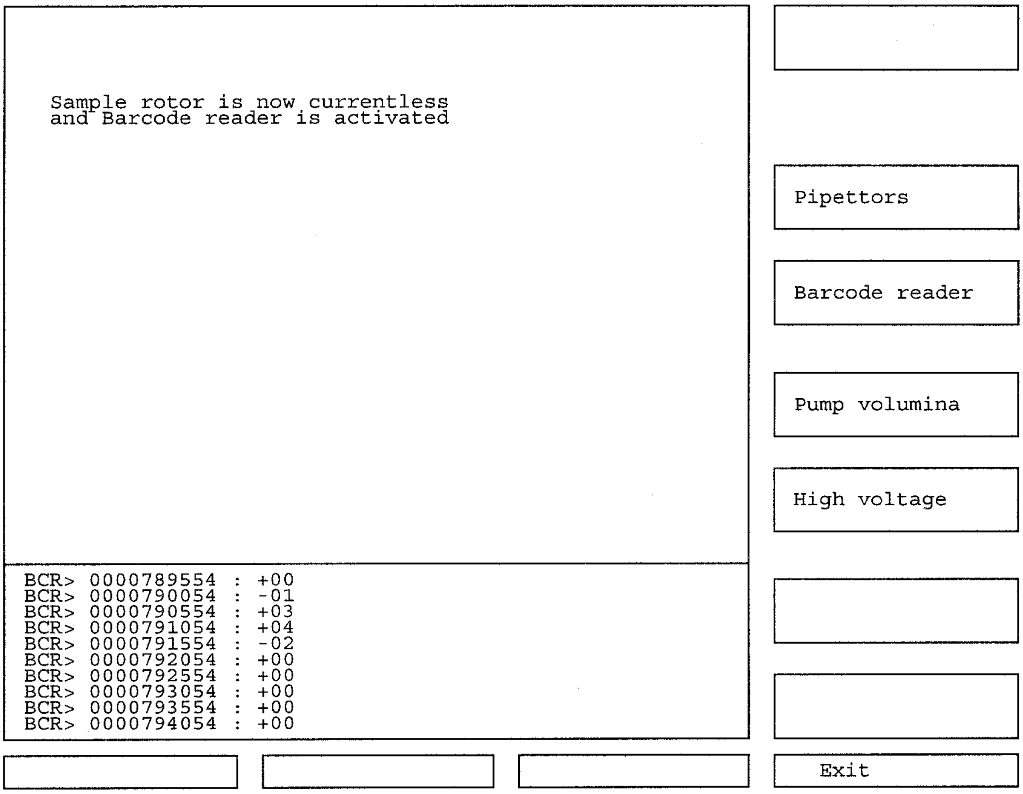
Note:

Adjustments vertically on Ref. Positions: Adjust the needles or the beadmixer almost touching the surface of the rotor.

Adjustments vertically on the washing stations means: Adjust the needle tip or beadmixer tip on the rim of the washing station.

Adjustment of STAT sample Ref. 5: It is possible to adjust the STAT Pos. without removing the cover. Insert a tube in STAT Pos. S1. Adjust the dosing needle in the centre of the tube. Move the needle down until the needle touches the bottom of the tube (watch the crash sensor).

6.2.6.2 Adjustments ⇨ Barcode-Reader



```
Sample rotor is now currentless
and Barcode reader is activated
```

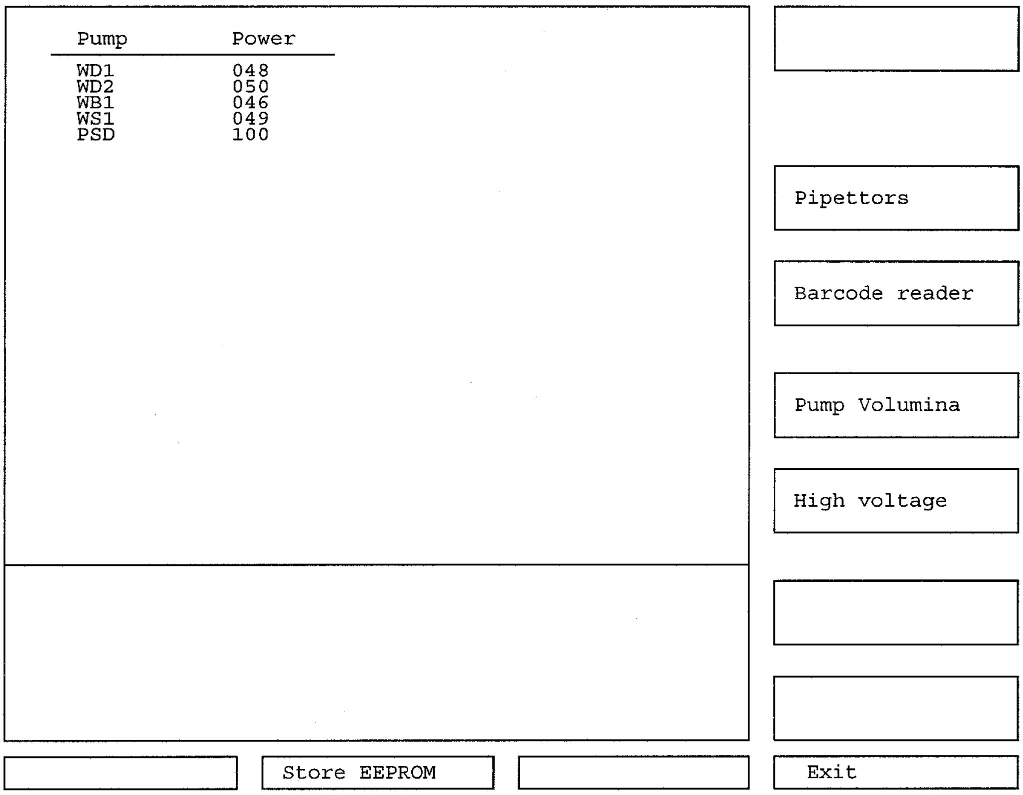
```
BCR> 0000789554 : +00
BCR> 0000790054 : -01
BCR> 0000790554 : +03
BCR> 0000791054 : +04
BCR> 0000791554 : -02
BCR> 0000792054 : +00
BCR> 0000792554 : +00
BCR> 0000793054 : +00
BCR> 0000793554 : +00
BCR> 0000794054 : +00
```

Fig. 6-2-25

After selection of the ”Barcode reader” function in the adjustment-menu the sample rotor is set currentless and the reader is periodically activated.
When the special barcode-card (with the tilt-angle) is set onto the rotor and the card is located in front of the Barcode reader, the actual tilt angle of the Reader will be displayed in the lower part of the screen.
The angle can be modified with the adjustment screw at the suspension of the Barcode reader.
The adjustment should be done by setting the value to +00.

This function can be terminated by pressing the **Exit** key.

6.2.6.3 Adjustments ⇨ Pump Volume



Pump	Power
WD1	048
WD2	050
WB1	046
WS1	049
PSD	100

Fig. 6-2-26

If the function ”Pump Volume” is selected in the Adjustments menu, a list of the washing stations and their actual power values is displayed in the window.

With the cursor **Up** and **Down** keys the required adjustment can be selected from the list. Each pump can be edited seperatly. A new power value can be entered with the numerical keys. The power values can be changed within the ranges shown in the chart below.

After pressing the **Enter** key the corresponding macro is loaded from diskette into the memory (RAM). Afterwards it is possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

Fill the waste output tubing in an measuring cup and check wether the necessary volume is achieved. For the possible output ranges refer to the following chart.

pump	power range	output volume in ml
WD1	35 - 90	42 ± 2
WD2	35 - 90	42 ± 2
WB1	35 - 90	45 ± 5
WS1	35 - 90	40 ± 2
PSD	50 - 100	18 ± 1

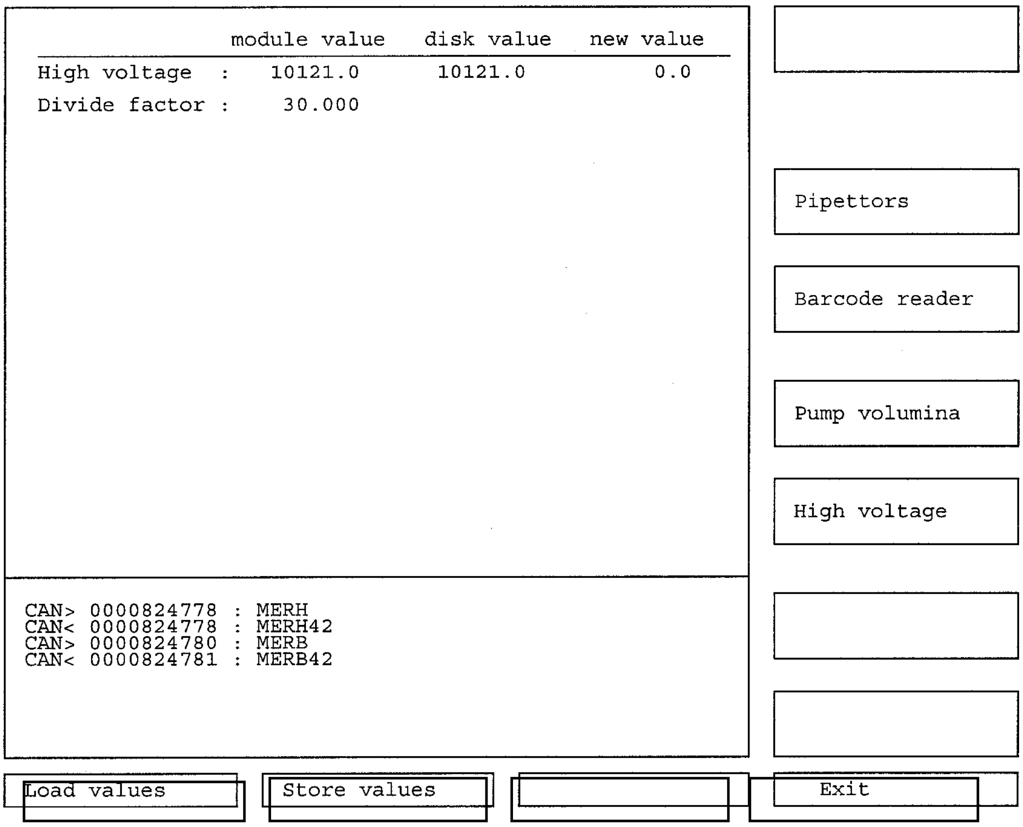
Fig. e-6-1

After adjustments are finished you can store the new values by pressing the Store **EEPROM** key.

Note:

In order to store the values on disk as well, the “Store values” function in the “Pipettor adjustment” screen needs to be activated (see page 27).

6.2.6.4 Adjustments ⇨ High Voltage



```
                 module value   disk value   new value
High voltage  :    10121.0       10121.0          0.0
Divide factor :     30.000
```

```
CAN> 0000824778 : MERH
CAN< 0000824778 : MERH42
CAN> 0000824780 : MERB
CAN< 0000824781 : MERB42
```

Pipettors
Barcode reader
Pump volumina
High voltage
Load values
Store values
Exit

Fig. 6-2-27

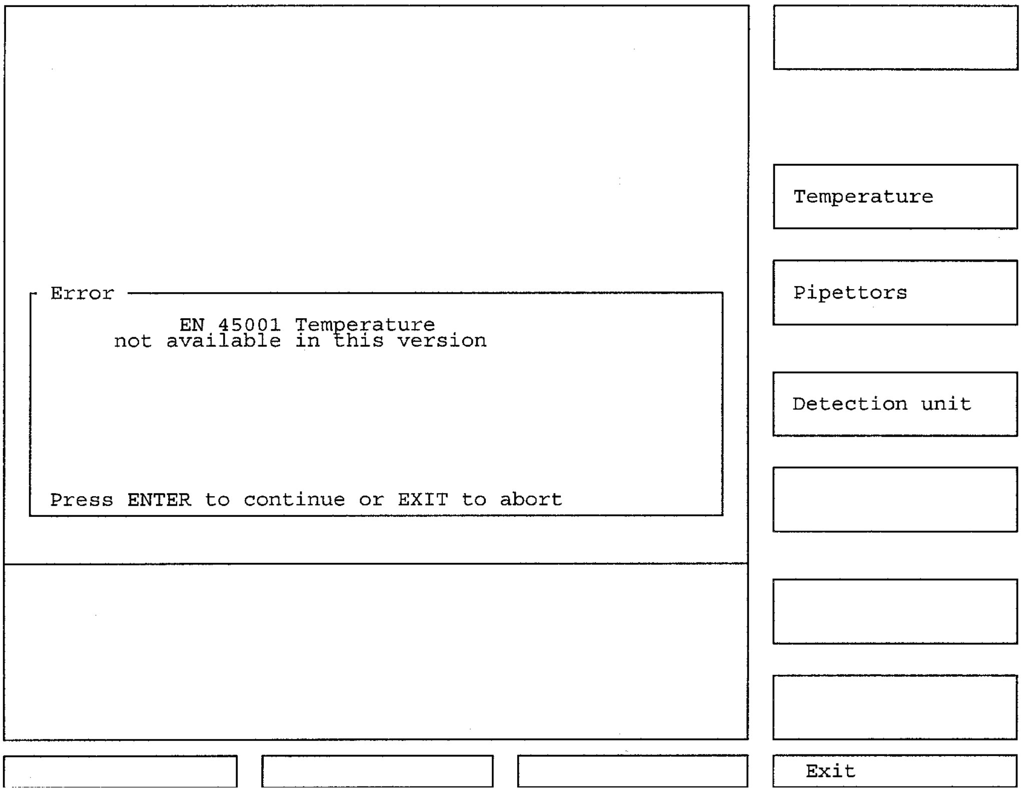
After selection of the ”High voltage” function in the adjustment-menu a screen appears and it is possible to enter the new values for the high voltage.

You can leave this function by pressing the **Exit** key.

Note:

The original factory value is stored on the adjustment diskette which is send with the instrument. When replacing the PMT make sure to store the new value on the adjustment diskette.

6.2.6.5 Adjustments ⇨ Quick Check



Error

EN 45001 Temperature
not available in this version

Press ENTER to continue or EXIT to abort

Fig. 6-2-31

If the function "Quick Check" is selected in the Ajustment menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards it is possible either to start the macro in "Single-Step" or "Run-Mode" or cancel the function by pressing the **Exit** key.

This macro will move the Rotors and MFA to all different adjustment positions, which are given in the **Adjustment/ Pipettors** screen. The positions where the MFAs and Rotors are going to move to (after pressing the ENTER button) are displayed in the Macro Message window.

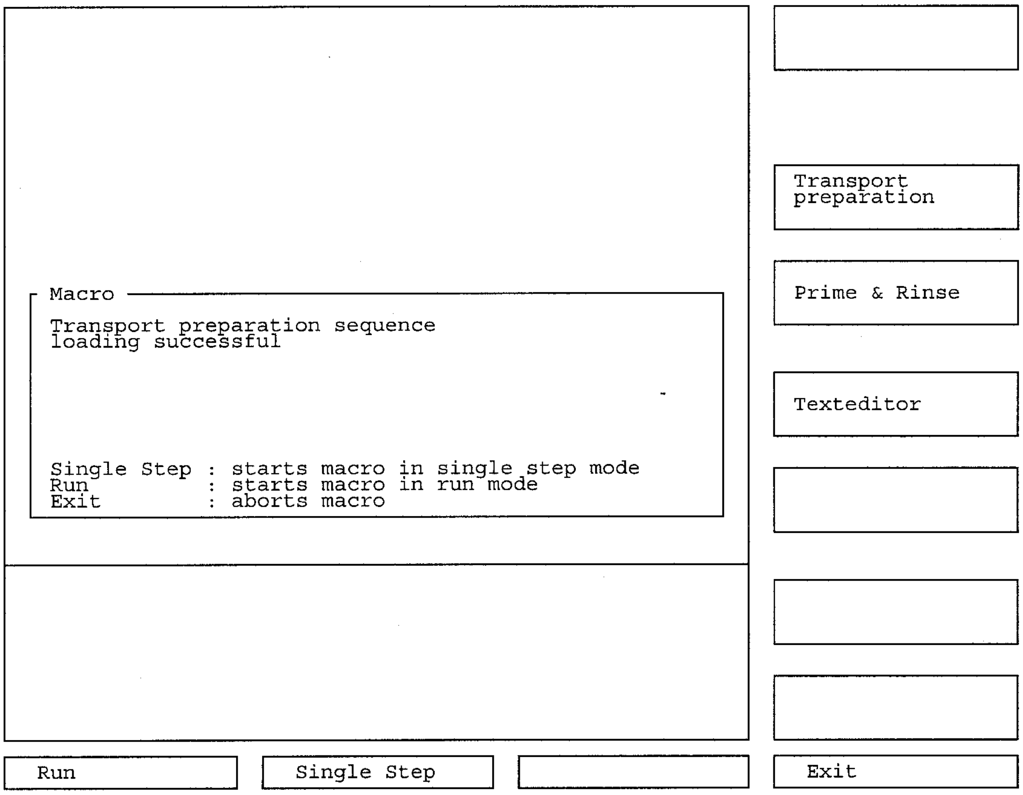
With this function it is possible **to check** all mechanical adjustment positions in less than 5 minutes !

Note:

Adjustment are not possible in this screen.

6.2.7 Special functions / Detailed description

6.2.7.1 Special functions ⇨ Transport Preparation



Macro

Transport preparation sequence
loading successful

Single Step : starts macro in single step mode
Run : starts macro in run mode
Exit : aborts macro

Fig. 6-2-28

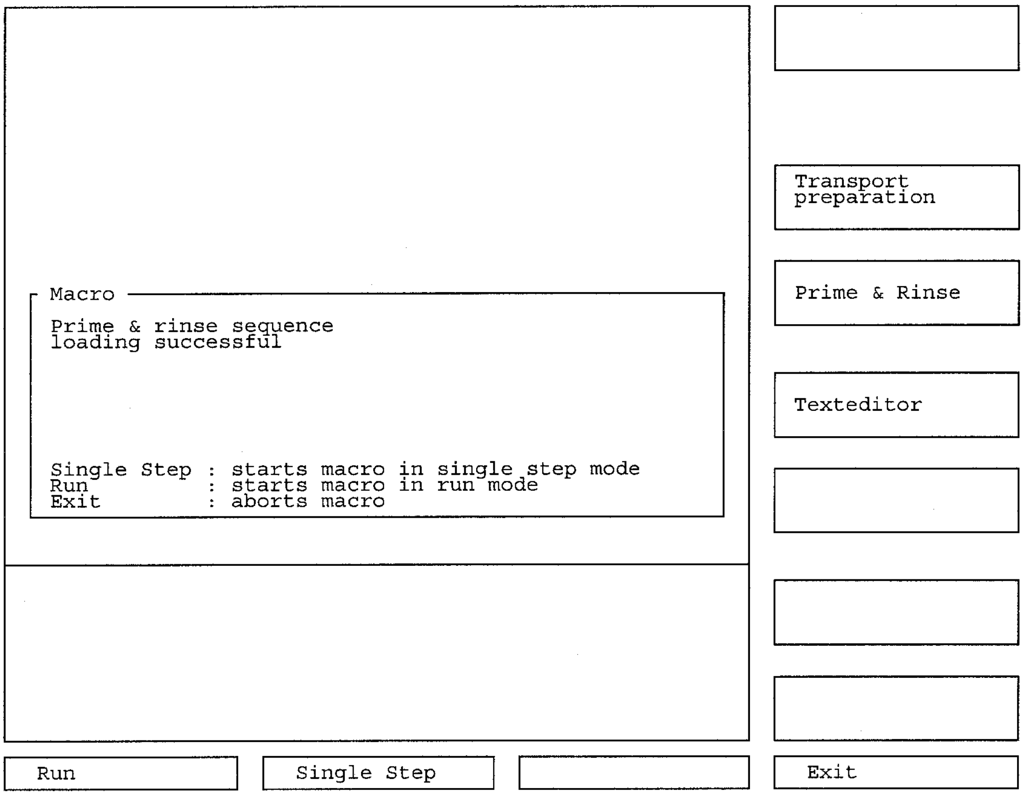
If the function ”Transport Preparation” is selected in the Special Functions menu, the corresponding macro is loaded from diskette into the memory (RAM). Afterwards it is possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

Note:

Empty water container and put into place again
Place ProCell and CleanCell in block 1

The following action is done:
- Drain WD1
- Drain WD2
- Drain WB
- prime sipper side with air
- Prime S/R side with air
- Drain WS1
- Prime to cell with ProCell

6.2.7.2 Special functions ⇨ prime & rinse



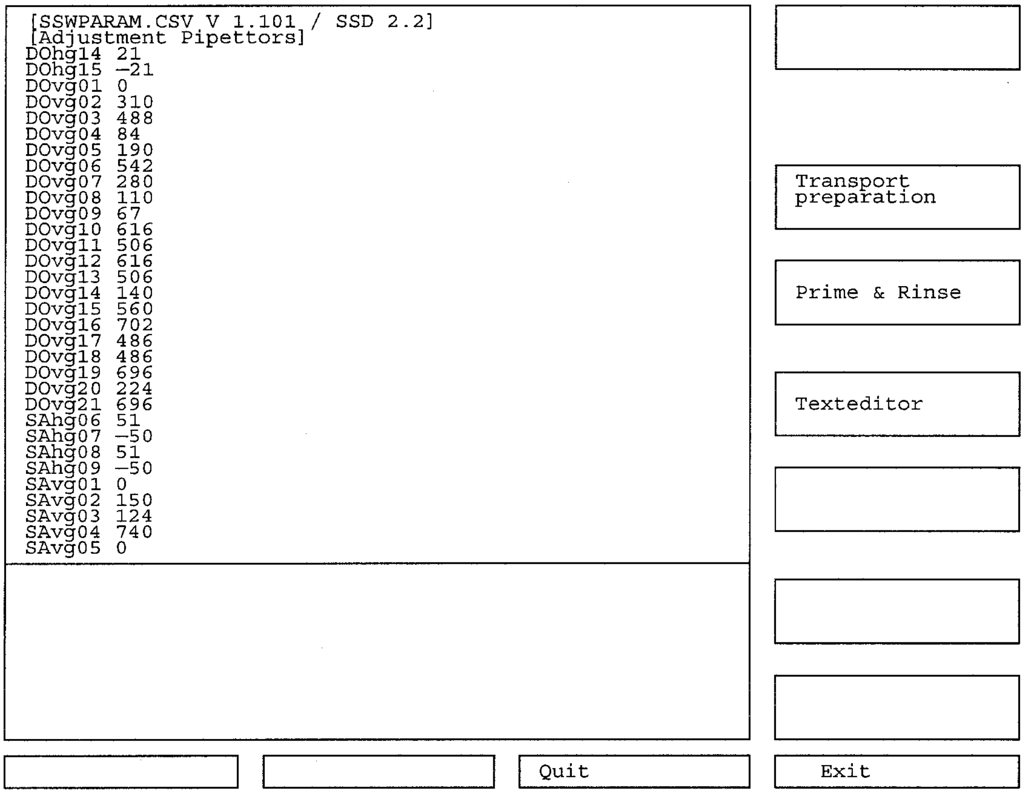
```
Macro
Prime & rinse sequence
loading successful

Single Step : starts macro in single step mode
Run         : starts macro in run mode
Exit        : aborts macro
```

Fig. 6-2-29

If the function ”Prime & Rinse” is selected in the Special Functions menu, the corresponding macro is loaded from diskette into the memory (RAM).Afterwards it is possible either to start the macro in ”Single-Step” or ”Run-Mode” or to cancel the function by pressing the **Exit** key.

The following action is done:
- Prime WD1,WD2 and WB
- Prime S/R side with water
- Prime WS
- Prime sipper syringe 4 times

6.2.7.3 Special functions ⇨ Texteditor



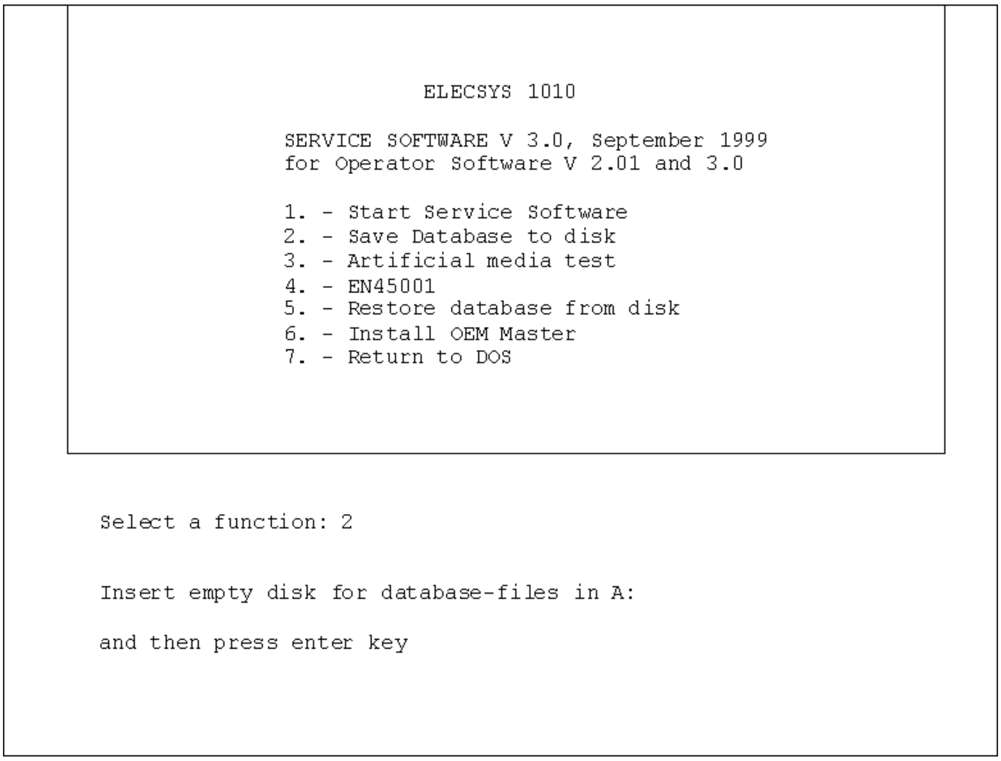
```
[SSWPARAM.CSV V 1.101 / SSD 2.2]
[Adjustment Pipettors]
DOhg14 21
DOhg15 -21
DOvg01 0
DOvg02 310
DOvg03 488
DOvg04 84
DOvg05 190
DOvg06 542
DOvg07 280
DOvg08 110
DOvg09 67
DOvg10 616
DOvg11 506
DOvg12 616
DOvg13 506
DOvg14 140
DOvg15 560
DOvg16 702
DOvg17 486
DOvg18 486
DOvg19 696
DOvg20 224
DOvg21 696
SAhg06 51
SAhg07 -50
SAhg08 51
SAhg09 -50
SAvg01 0
SAvg02 150
SAvg03 124
SAvg04 740
SAvg05 0
```

Fig. 6-2-30

After selection of the ”Texteditor” function in the Special Functions menu, you can select for editing either “csv-”or “adj-” files with the **Up/Down** keys. After pressing the **Enter** key a list of all drives (A:, C:, D:) appears. A drive can be selected with the **Up/Down** keys. After pressing the **Enter** key, a list of all “csv” or “adj” files, which exist on this drive, will appear on the screen. A file can be selected with the **Up/Down** keys. After pressing the **Enter** key, the file will be loaded into the memory and it is possible to edit the file.

Press **Exit** to save and leave the editor.
Press **Quit** to leave the editor without saving.

6.2.8 Save/Restore Database To/From Disk



```
                    ELECSYS 1010

           SERVICE SOFTWARE V 3.0, September 1999
           for Operator Software V 2.01 and 3.0

           1. - Start Service Software
           2. - Save Database to disk
           3. - Artificial media test
           4. - EN45001
           5. - Restore database from disk
           6. - Install OEM Master
           7. - Return to DOS


Select a function: 2


Insert empty disk for database-files in A:

and then press enter key
```

Fig. 6-2-32

The ELECSYS 1010 D:\ drive carries all relevant information as Inventory data, QC data, Test Requisitions, Test Results, Reference data, and all Calibration data (Assay and Instrument). If the D:\drive is deleted, all the a.m. data will be lost.

The function **Save Database to disk** stores the complete content of the ELECSYS 1010 D:\ drive onto a 3.5 " floppy disk.

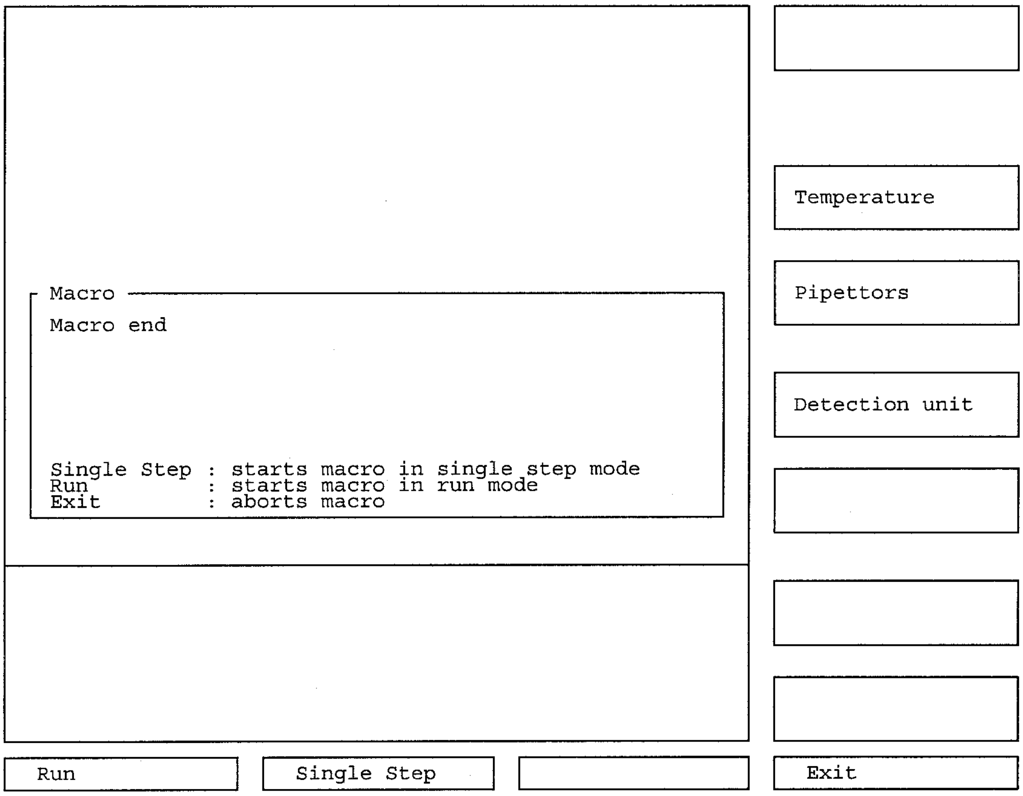
It is strongly recommended to create such a BACKUP disk **before any of the Artificial Media Tests Runs or EN45001 Test Runs are performed**.

This function is accessible in the main menu of the Service Software disk.

Select option 2: **Save database to disk**

If the function is activated, the program will ask for an empty (!) formatted disk. Please insert the disk and press the ENTER key.

When all data are stored, the following screen will appear:



```
Macro
Macro end

Single Step : starts macro in single step mode
Run         : starts macro in run mode
Exit        : aborts macro
```

Fig. 6-2-33

Please follow the instructions on the screen and return to the Main menu by pressing the ENTER button.

Restore Database from Disk

In order to restore the previously stored data back to the D:\drive, select option 5 in the Main menu of the Service Software disk and follow the instructions on the screen. Please check, if are any files on D:\drive before you select this function.

It is recommended to delete all files before the Backup data are restored.

6.2.9 Artificial Media Test

In order to check the Elecsys 1010 instrument condition, it is possible to perform special test runs using the Elecsys AM test reagents.

The following AM test runs are available:

- **SAP Test**
- **TSH Test**
- **GC Test**

Required Reagents:

1.	SAP	Id.No.:182 0435 122
2.	Cell Check	Id.No.:182 0451 122
3.	Blank Cell	Id.No.:172 9306 001
4.	TSH	Id.No.:173 1459 122
5.	TSH Calibrator	Id.No.:173 1483 122

SAP Test:

The SAP Reagent consists of Beads, Bead Buffer Solution and Free Conjugate. Beads and Bead Buffer Solution are basically the same as they are used in the Elecsys Test assays.
The Free Conjugate however, consists of biotinylated sheep antibodies solved in ProCell.
Since the Elecsys does complete cycles (including bead capturing), this **Test** can be used to test the **Magnet Drive**, **Pipetting System** (Reagent) as well as the **Detection System**.
If the SAP Test is started, the instrument will perform 10 measurements, afterwards the mean as well as the CV value can be calculated.

TSH Test:

For this test the original TSH Reagents are used.
The instrument will determine 10 times the signal.
Of the TSH calibrator 1 and 5 times the signal of calibrator 2.
The following data will be displayed and calculated:

- TSH counts for Calibrator 1 and 2.
- Mean and CV of these measurements
- Deviation of the first cal1 measurement compared to the mean value [%]

This test can be used to check the **precision of the Pipetting System** (Sample and Reagent) and to test the **Magnet Drive as well as the Detection System.**

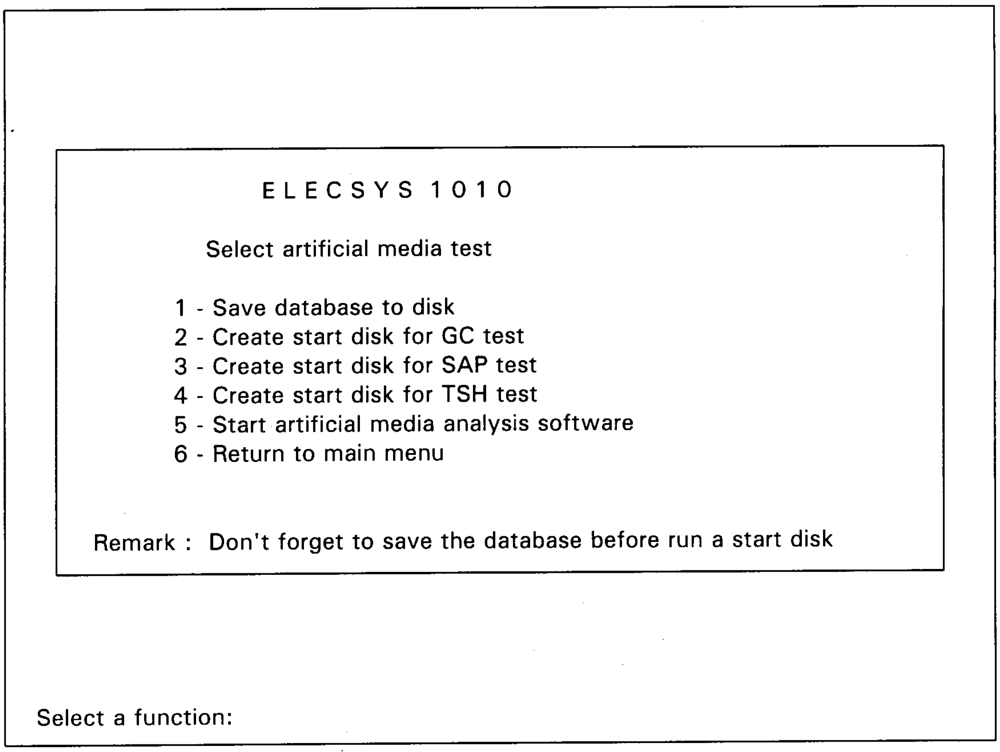
GC Test:

The GC Test is a **complete instrument check**.
It is basically a combination of the a.m. SAP and TSH test in addition the GC Test will perform BlankCell Reagent **measurements**.
This BlankCell Reagent consists of ProCell (R1) and a Ruthenium solution (Ru(bpy)3 as R2.
The BlankCell Reagent is a ”homogenous” this means that signals will be measured even without bead capturing.

The following values (including the acceptable ranges) are issued:

SAP TEST	Signals, mean, CV including "Recovery"
CO (Carry Over)	Carry over from the SAP Test to BC R1
BlankCell	Signals,mean, CV including 1:20 dilution
TSH Test	Signals, mean,CV

6.2.9.1 Artificial Media Test ⇨ Run Preparation



```
                    E L E C S Y S  1 0 1 0

                  Select artificial media test

              1 - Save database to disk
              2 - Create start disk for GC test
              3 - Create start disk for SAP test
              4 - Create start disk for TSH test
              5 - Start artificial media analysis software
              6 - Return to main menu


   Remark :  Don't forget to save the database before run a start disk



 Select a function:
```

Fig. 6-2-34

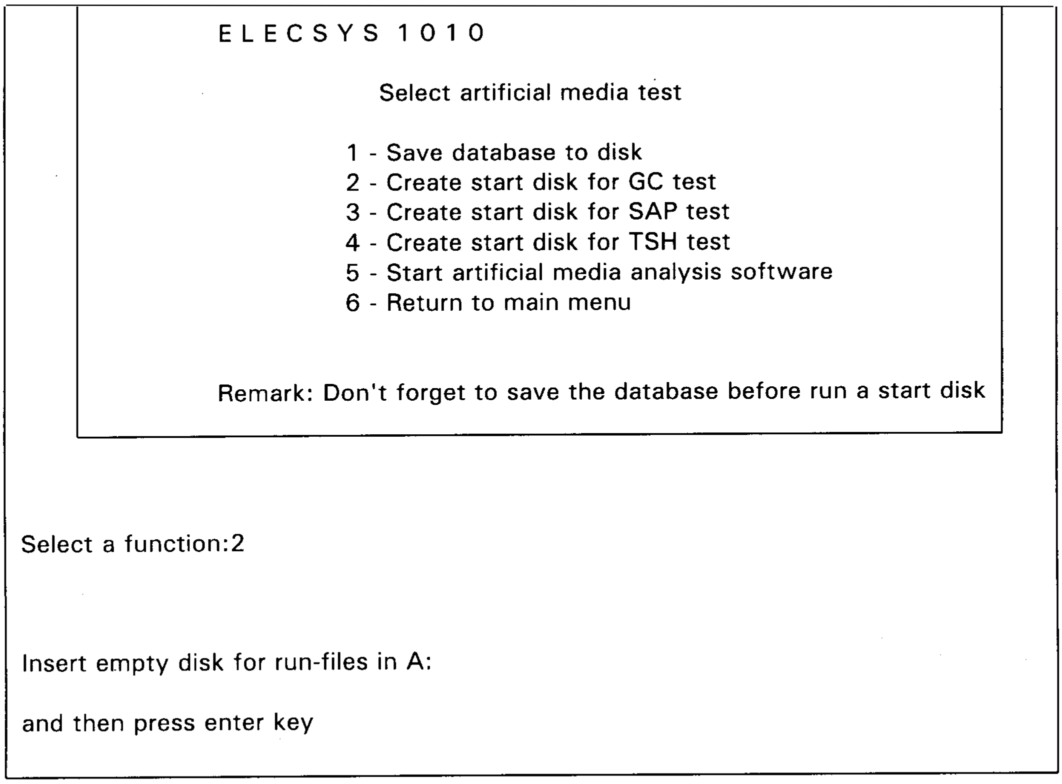
General:

The Service will create one ”Run File” disks for each test run. This disk contains all necessary information for the Operator Software to perform a run. As soon as the Operator Software detects that such a Run File disk is inserted, it will perform the run according to the information given on the disk.
When the test run is finished, the Operator Software will automatically store the results into a specific file of the Run File disk.
The evaluation of the test run results will be done by the Service Software (Artificial Test Analysis).

Each test run (SAP, TSH, GC) needs a specific Run File Disk. The type of test run is selected in the Artificial Media Test menu.

Important:

It is absolutely necessary, that a Backup copy of the Elecsys D:\drive is created.
(See chapter 6.2.8 of this manual) !
Otherwise all Inventory data, patient data, QC and Calibration data will be lost.

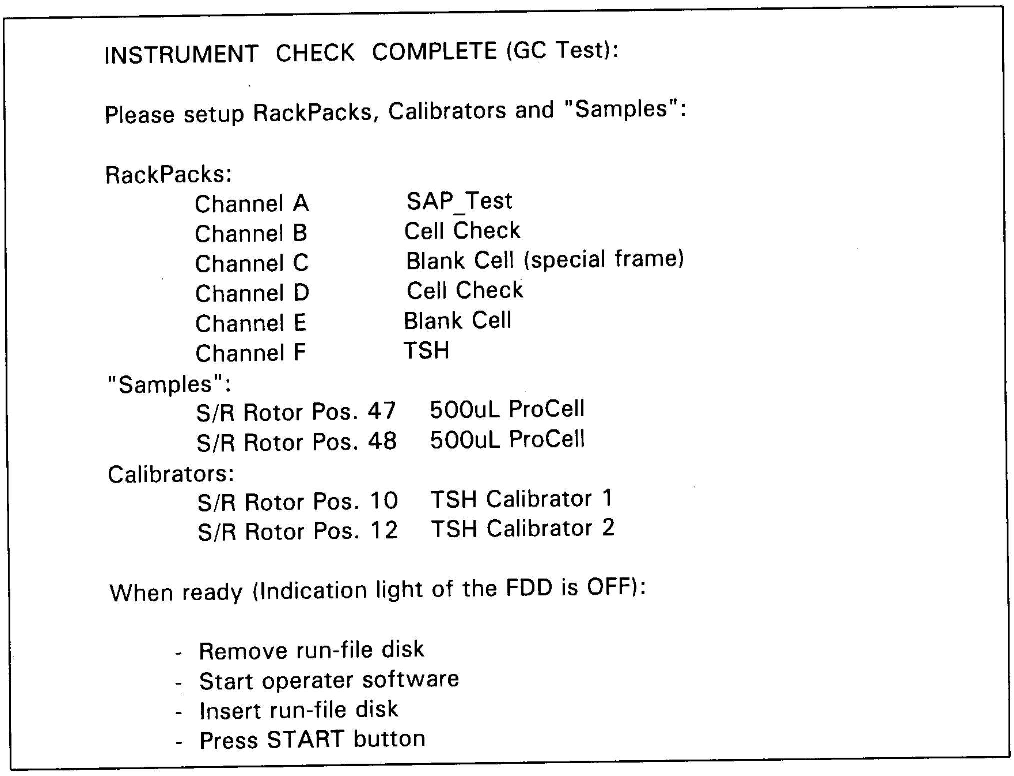


```
ELECSYS 1010

Select artificial media test

1 - Save database to disk
2 - Create start disk for GC test
3 - Create start disk for SAP test
4 - Create start disk for TSH test
5 - Start artificial media analysis software
6 - Return to main menu

Remark: Don't forget to save the database before run a start disk

Select a function:2

Insert empty disk for run-files in A:

and then press enter key
```

Fig. 6-2-35

As soon as a certain test run is selected (e.g. "2" for the GC test), an empty (!), DOS formatted disk is to be inserted into drive A:

While the Run File disk is being prepared, the Service Software will display, how the Instrument needs to be set up for the test run.



```
INSTRUMENT CHECK COMPLETE (GC Test):

Please setup RackPacks, Calibrators and "Samples":

RackPacks:
        Channel A         SAP_Test
        Channel B         Cell Check
        Channel C         Blank Cell (special frame)
        Channel D         Cell Check
        Channel E         Blank Cell
        Channel F         TSH
"Samples":
        S/R Rotor Pos. 47   500uL ProCell
        S/R Rotor Pos. 48   500uL ProCell
Calibrators:
        S/R Rotor Pos. 10   TSH Calibrator 1
        S/R Rotor Pos. 12   TSH Calibrator 2

When ready (Indication light of the FDD is OFF):

      - Remove run-file disk
      - Start operater software
      - Insert run-file disk
      - Press START button
```

Fig. 6-2-36

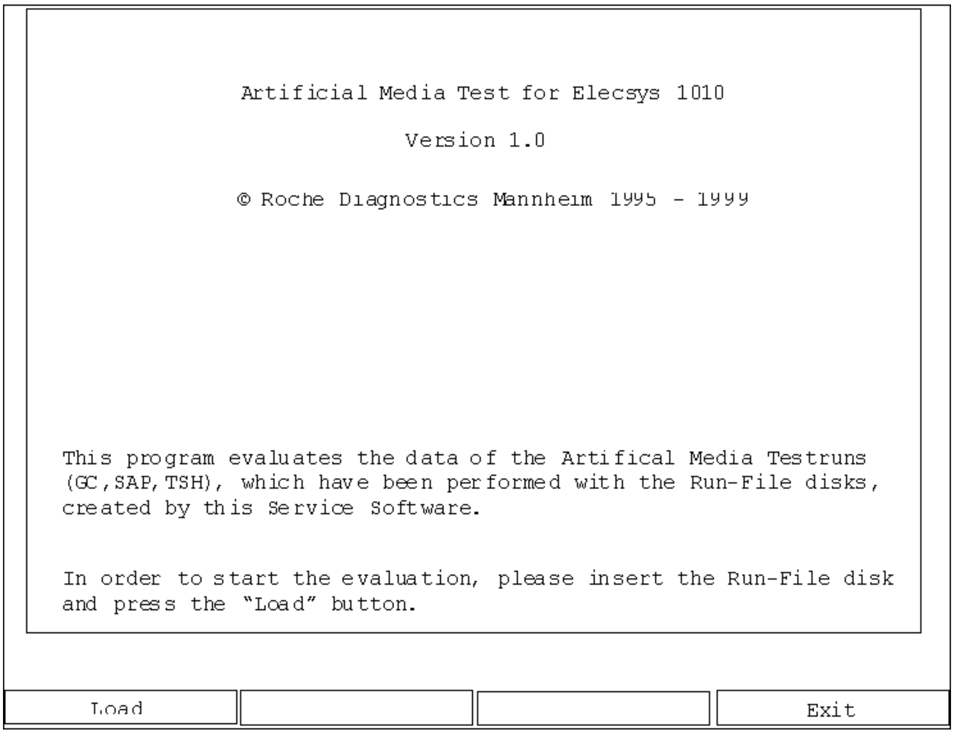
Please place RackPacks, Samples and Calibrators accordingly (Example GC test)

When all Reagents are placed, remove the Run File disk and write the type of test run (SAP,TSH or GC) onto the disk label.
Afterwards, switch the instrument on and wait until the initialization is finished.
Please check the availability of the System Reagents (ProCell and CleanCell) and check the INVENTORY OF THE Assay Cups.
Insert the Run File disk and press the START button.
The Operator Software will recognize the Run File disk and will perform the run according to the information given on this disk.

It is not necessary to input any additional information.

When the run is finished, the Operator Software will store the test run results onto the Run File disk.

6.2.9.2 Artificial Media Test ⇨Test Analysis



Artificial Media Test for Elecsys 1010

Version 1.0

© Roche Diagnostics Mannheim 1995 - 1999

This program evaluates the data of the Artifical Media Testruns (GC,SAP,TSH), which have been performed with the Run-File disks, created by this Service Software.

In order to start the evaluation, please insert the Run-File disk and press the “Load” button.

Fig. 6-2-37

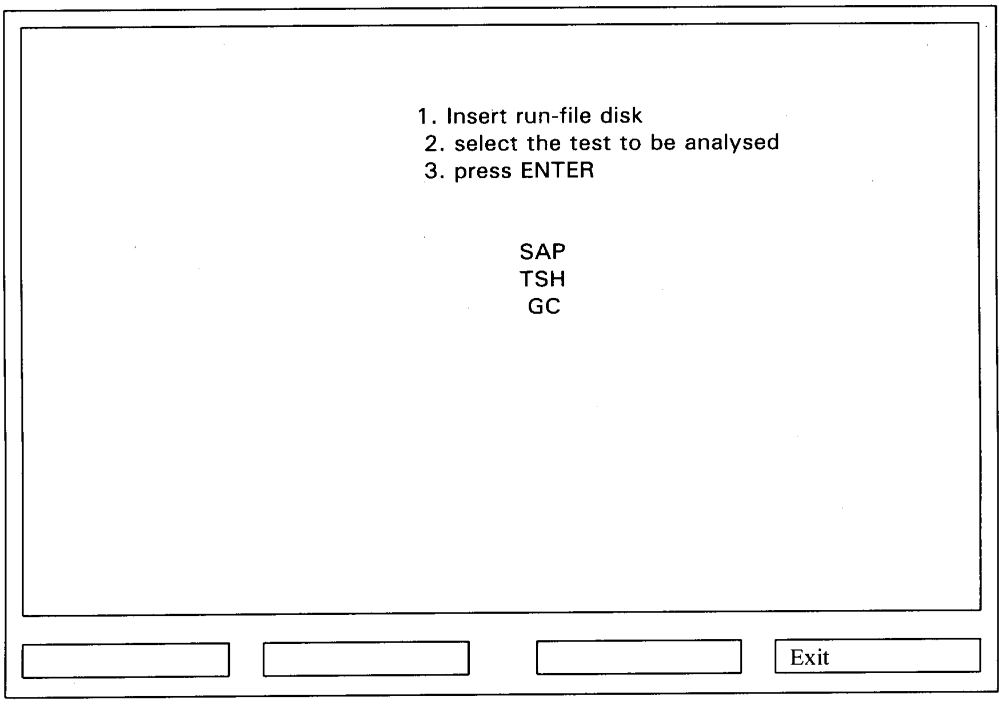
Target value of the BCR 2 (BlankCell) Reagent:

When the test run is finished, remove the Run File disk and start the Service Software.
With the help of the *Texteditor* in the menu *Special Functions*, the target value of the BC R2 Test can be checked and edited.
This value is stored on the file ”RECOVERY.CSV” of the Service Software disk.

Test Analysis:

In order to start the evaluation of the test performed, select option 5 in the Artificial Media Test menu of the Service Software, see screen on fig. 6-2-37.

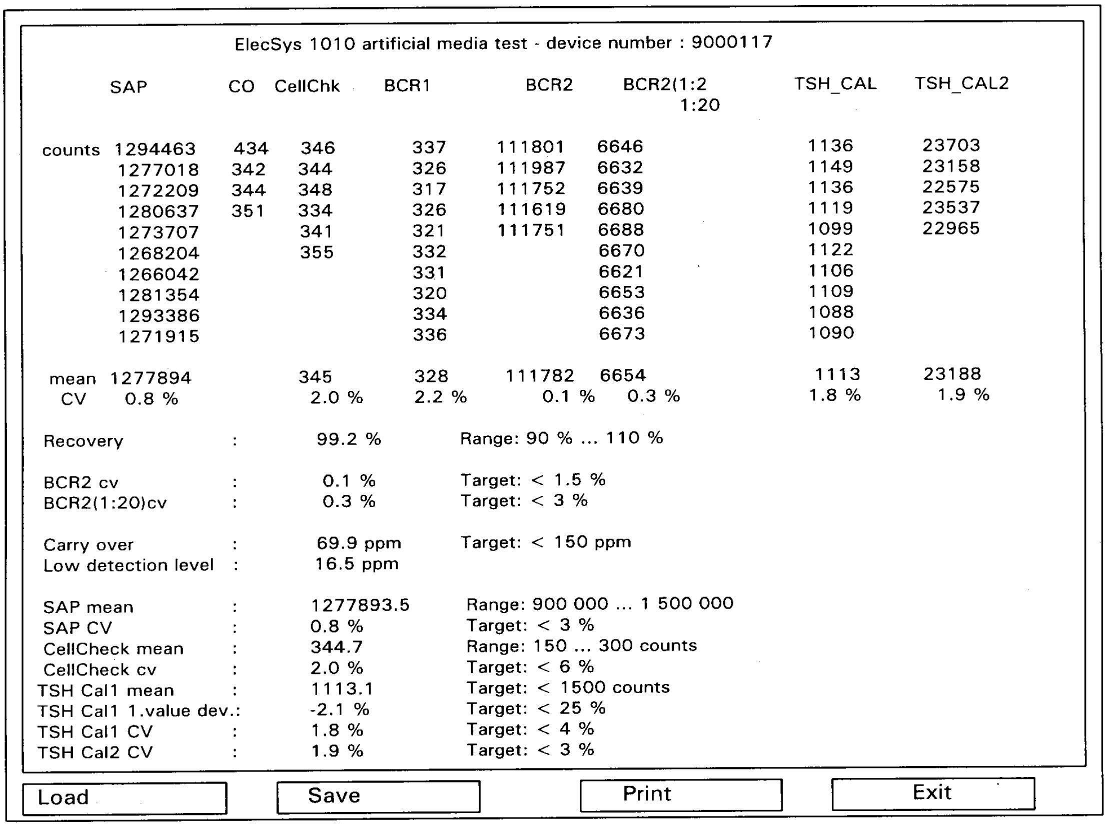
Please insert the Run disk and press the *Load* button



1. Insert run-file disk
2. select the test to be analysed
3. press ENTER

Fig. 6-2-38

When this screen appears, select the test to be analyzed and press *Enter* key.



```
                    ElecSys 1010 artificial media test - device number : 9000117

         SAP        CO  CellChk   BCR1        BCR2     BCR2(1:2         TSH_CAL     TSH_CAL2
                                                             1:20

counts 1294463     434   346       337     111801   6646                1136        23703
       1277018     342   344       326     111987   6632                1149        23158
       1272209     344   348       317     111752   6639                1136        22575
       1280637     351   334       326     111619   6680                1119        23537
       1273707           341       321     111751   6688                1099        22965
       1268204           355       332              6670                1122
       1266042                     331              6621                1106
       1281354                     320              6653                1109
       1293386                     334              6636                1088
       1271915                     336              6673                1090

 mean  1277894           345       328      111782  6654                1113        23188
  CV     0.8 %            2.0 %    2.2 %       0.1 %   0.3 %            1.8 %        1.9 %

Recovery              :      99.2 %       Range: 90 % ... 110 %

BCR2 cv               :       0.1 %       Target: < 1.5 %
BCR2(1:20)cv          :       0.3 %       Target: < 3 %

Carry over            :      69.9 ppm     Target: < 150 ppm
Low detection level   :      16.5 ppm

SAP mean              :     1277893.5     Range: 900 000 ... 1 500 000
SAP CV                :     0.8 %         Target: < 3 %
CellCheck mean        :     344.7         Range: 150 ... 300 counts
CellCheck cv          :     2.0 %         Target: < 6 %
TSH Cal1 mean         :     1113.1        Target: < 1500 counts
TSH Cal1 1.value dev.:      -2.1 %        Target: < 25 %
TSH Cal1 CV           :     1.8 %         Target: < 4 %
TSH Cal2 CV           :     1.9 %         Target: < 3 %
```

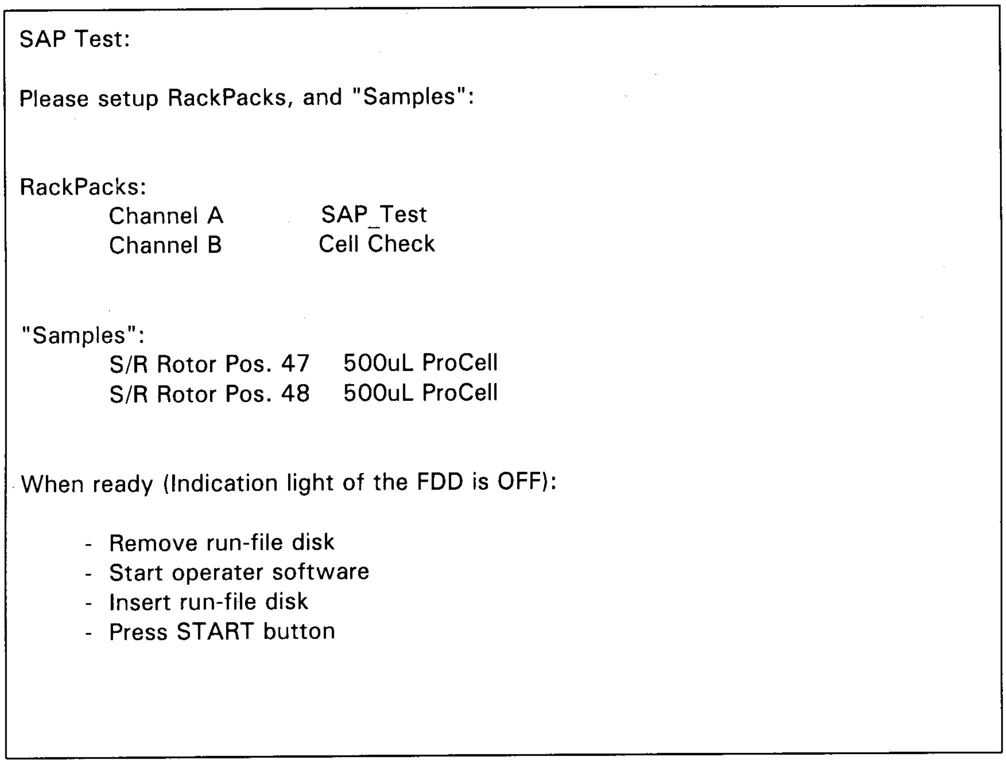
Fig. 6-2-39

The results of the Artificial Media Test run will be displayed on this screen (Example GC Test)

The a.m. data may be printed directly (Internal Printer) or save onto a disk. In case of saving the data, the Software will automatically create a specific file. The filename consists of the instrument serial number and has the extension *.smt (e.g. 90000117.smt). These files may be opened, displayed (printed) using any editor.

6.2.9.3 Artificial Media Test ⇨ Sample/ Reagent Setup

Setup for SAP Test



```
SAP Test:

Please setup RackPacks, and "Samples":


RackPacks:
          Channel A        SAP_Test
          Channel B        Cell Check


"Samples":
          S/R Rotor Pos. 47    500uL ProCell
          S/R Rotor Pos. 48    500uL ProCell


When ready (Indication light of the FDD is OFF):

        -  Remove run-file disk
        -  Start operater software
        -  Insert run-file disk
        -  Press START button
```

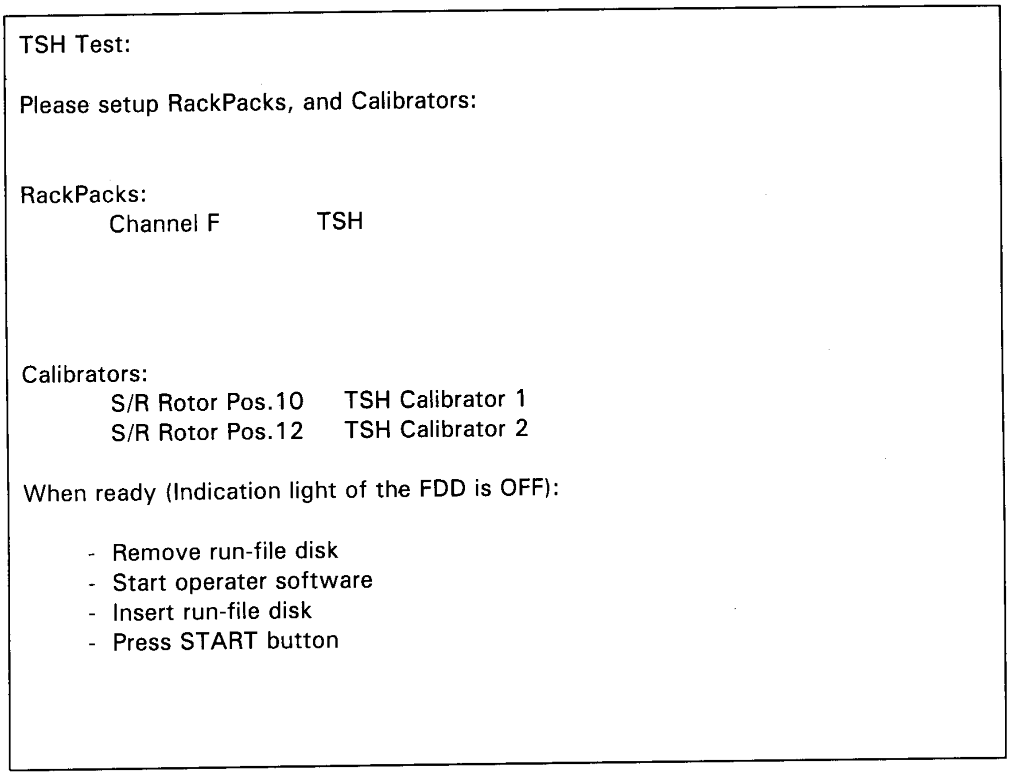
Fig. 6-2-40

The setup of Samples and Reagents is displayed while the Run File disks are being prepared. Please check the availability of System Reagents, System Water and Assay Cups in addition.

Required Reagent:

1. SAP	Id No. 182 0435 122
2. Cell Check	Id Nor. 182 0451 122

Setup for TSH Test



TSH Test:

Please setup RackPacks, and Calibrators:

RackPacks:
Channel F TSH

Calibrators:
S/R Rotor Pos.10 TSH Calibrator 1
S/R Rotor Pos.12 TSH Calibrator 2

When ready (Indication light of the FDD is OFF):

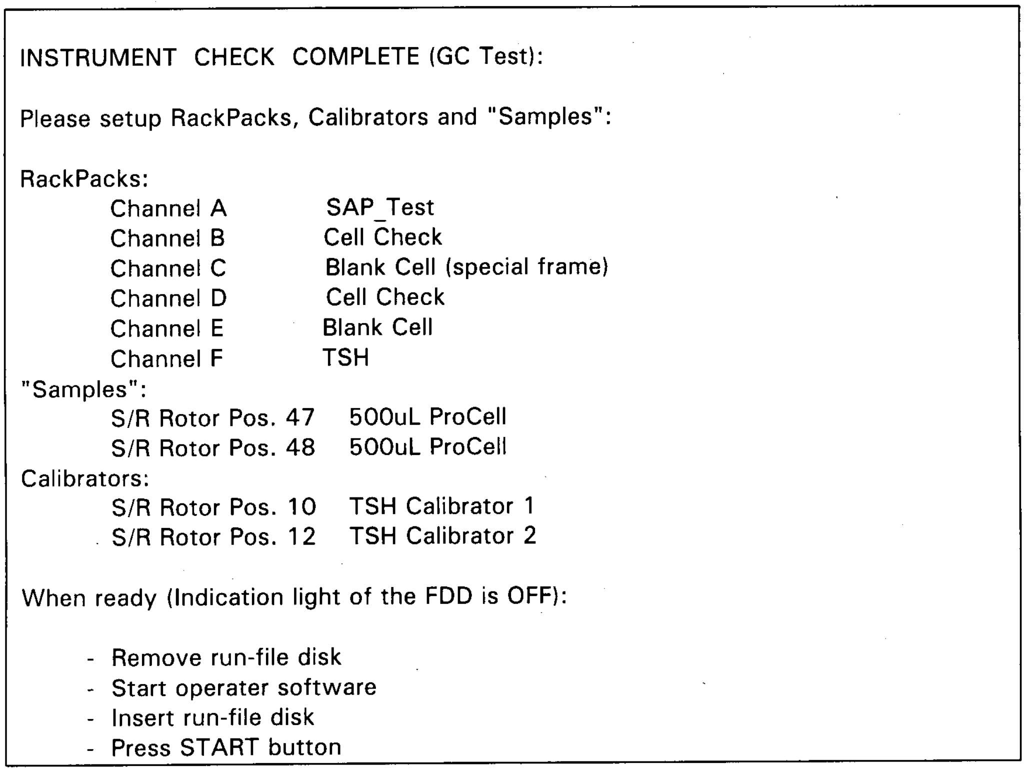
- Remove run-file disk
- Start operater software
- Insert run-file disk
- Press START button

Fig. 6-2-41

Required Reagent:

1. TSH Id No. 173 1459 122

Setup for GC Test



```
INSTRUMENT  CHECK  COMPLETE (GC Test):

Please setup RackPacks, Calibrators and "Samples":

RackPacks:
          Channel A          SAP_Test
          Channel B          Cell Check
          Channel C          Blank Cell (special frame)
          Channel D          Cell Check
          Channel E          Blank Cell
          Channel F          TSH
"Samples":
          S/R Rotor Pos. 47    500uL ProCell
          S/R Rotor Pos. 48    500uL ProCell
Calibrators:
          S/R Rotor Pos. 10    TSH Calibrator 1
          S/R Rotor Pos. 12    TSH Calibrator 2

When ready (Indication light of the FDD is OFF):

        -  Remove run-file disk
        -  Start operater software
        -  Insert run-file disk
        -  Press START button
```

Fig. 6-2-42

Important:

The Blank Cell reagent on position C needs to be placed into a special frame.
The Reagents will be pipetted out of the R1 and R2 position and not out of the outer Bead position.
For this reason is it necessary to remove the original plastic frame which holds the Blank Cell Rack Pack and to replace it by a frame with 3 bottle positions (e.g. of a TSH Rack Pack).

Required Reagent:

1. SAP	Id No. 182 0435 122
2. Cell Check	Id No. 182 0451 122
3. Blank Cell	Id No. 172 9306 001
4. TSH	Id No. 173 1459 122

6.2.9.4 Artificial Media Test ⇨Summary

In order to prepare, to perform and to evaluate an Artificial Media test run, the following steps are to be done:

1. Create a backup Disk of the Elecsys 1010 D:\ drive.(Main Menu option 2)
2. Select the test to be performed. (AM Menu option 2-4)
3. Insert an empty disk into drive A: (Later Run File disk)
4. Setup Samples and Reagents according to the displayed information (see 9.2.6.3)
5. Remove the disk, and start the actual Operating Software
6. When the initialization is finished and insert the Run File disk
7. Press the START button
8. When the run is finished, load the Service Software
9. Check, if the actual value in the file ”Recovery.csv” and the target value of the BCR2 Reagent are the same. If necessary edit the file.(Texteditor)
10. Select Artificial Media Test Analysis (AM Menu option5)
11. Select the test to be analyzed
12. Print out the results or save them on disk
13. Restore the Backup Data to drive D: (Main Menu option 5)

6.2.10 OEM Master Installation

OEM Master installation

- Select in the Service Software menu option number **2** (⇨ Install OEM Master).
- Select in the OEM Master menu option number **1** (⇨ Flash disk installation).
- Select in the OEM Master menu option number **2** (⇨ SRAM-Disk installation).
- Select option number **3** (⇨ SRAM-Disk format).
- Ignore the Error message (Speicherzuordnungsfehler...) and switch off the instrument.
- Switch on the Elecsys® 1010 instrument with the user software diskette inserted.

Note:

Befor you perform the OEM Master installation you should copy all files on drive D: to a diskette

6.2.11 Remarks

6.3 DOS TUS Disk

The DOS TUS Software will be supplied on a 3.5" disk.
For ID-No., please refer to chapter 8.

6.4 OEM Master Installation

When installing a new OEM Master PCB, it needs to be configured. This procedure is part of the Service Software and described in chapter 6.2.

7 Trouble Shooting

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7.1 Alarm and Message Codes

7.1.1 Overview

The alarm / message codes consist of:
- alarm / message number
- occurrence counter
- severity level

The alarm / message numbers consist of 4 digits. The first digit identifies the module in whose environment the alarm is detected. Alarms and messages that does not belong to a concrete module are assigned to 'Instrument and environment'. Some result flags are not stored in the alarm log. They get 9 as the first digit.

First digit:	**Module**
0	**OEM master**
1	**Detection module**
2	**Sipper module**
3	**Temperature module**
4	**Rotor / rotor module**
5	**Sample reagent module**
6	**Incubator module**
7	**Clot detection module**
8	**Instrument and environment**
9	**Additional result flags**

The second to fourth digit identify the concrete alarm / message. The numbers 000 to 099 are reserved for the error messages received from the module. The last two digits are identical with the error number received from the module. Numbers higher than 099 are created by the master software. Some error numbers received from a module are translated to numbers higher than 099 to distinguish between different situations (i.e. 80 from sample reagent module to 5110 .. 5114).

An occurrence counter is added to the alarm code. In many cases the instrument is not immediately stopped after a problem is detected. Movings are tried again. Other problems have to occur several times or have to due a longer time before the instrument is stopped. The occurrence counter counts the consecutive occurrences or the due time in minutes of an error. The counter is limited to the digits 0 to 9. Higher values are cut to 9. The counter is not attached to results.

Each alarm or message is classified to a severity level. Severity levels are 'Information', 'Warning', 'Error' and 'Fatal error'.

Informations are for logging start and end of instrument actions like 'Run', 'Scan' and others.

Warnings are sporadic problems witch could be solved by the instrument itself or problems that could perhaps influence the accuracy of results.

Errors are real defects that influence the functionality of the instrument and problems that inhibits the production of one or multiple results or lead to erroneous results. Fatal errors inhibit the basis functionality of the instrument to perform measurements in a run. Runs are aborted or can not be started.

Some of the none fatal errors also abort the run or inhibit the start but can be resolved by the operator (inventory items). For different values of the occurrence counter the severity level may be different too. The severity level for an alarm number may also be different in different situations (e.g.: run preparation / run execution; access needle to washing station / access needle to rotor).

Errors and Fatal Errors are shown in the Alarm Screen. All levels of alarms are displayed in the Message History Screen (STATUS). The additional result flags are only shown in the result screens.

For results with error flags or fatal error flags no result value is calculated. Results with warning flags or error flags or fatal error flags are blocked by the instrument. Results with warning flags only may be released by the operator.

Examples for alarm / message codes:

0040-1 E:	OEM master; external printer time-out; error
2062-1 W:	Sipper module; horizontal arm lost steps; first occurrence; warning
3103-2 E:	Temperature module; temperature detection module out of range; 2 minutes long; error
4054-5 F:	Rotor / rotor module; sample reagent rotor fan defective; 5 minutes long; fatal error
5113-2 F:	Sample reagent module; no liquid level found in washing station; second occurrence; fatal error
8104-1 I:	Instrument and environment; run start; information

7.1.2 Alarm / Message Lists

The following tables show the possible alarms and messages codes separately for each module. They contain:

- the alarm / message number,
- a description of the detected problem,
- the severity level,
- the probable causes of the problem,
- the remedies that could be done by the operator and
- if a result value is calculated then the flag is attached to a result.

The module numbers diversified to different alarm numbers are included too. They may occur until the full diversification is implemented.

The description of the detected problem is not identical with the text displayed to the operator. The description should help a service or production person to solve the problem.

In case the severity level is different for different values of the occurrence counter the different levels are prefixed with the corresponding occurrence counter(s).

In case the remedy for a problem decribes to shut down the analyser, it is strongly adviced to do this according to the following procedure:

Switch off/on procedure:

1. Press STOP key
2. Switch the analyzer off
3. Wait at least 10 seconds
4. Close the cover
5. Then switch the analyzer on

In case that an alarm and message recurs on a regular base or the remedy does not solve the problem Roche Diagnostics Technical Support should be contacted.

In case an alarm code does not affect results N/A is shown for the calculation of the result value.

Abbreviations:

ADC	Analogue to Digital Converter
AE	Working Electrode
BCR	Barcode Reader
BIOS	Basic Input Output System
CAN	Controller Area Network
E	Error
EEPROM	Electrical Erasable and Programmable Read Only Memory
EPROM	Electrical Programmable Read Only Memory
F	Fatal error
I	Information
LLD	Liquid Level Detection
LSM	Laboratory System Manager
2-D BC	Two Dimensional Bar Code
OEM	Original Equipment Manufacture
PCB	Printed Circuit Board
PMT	Photo Multiplier Tube
RAM	Random Access Memory
RE	Reference Electrode
ROM	Read Only Memory
SRAM	Static Random Access Memory
SW	Software
VDC	Direct Current Voltage
W	Warning

7.1.3 OEM Master

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	BIOS:					
Beeper		RAM defective	F	RAM; PCB OEM master	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
Beeper		Video-RAM defective	F	Video-RAM; PCB OEM master	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
Beeper		Keyboard defective	F	Keyboard; PCB distribution keyboard; cables PC6, PC61; PCB OEM master	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
	CAN-Bus:					
0010	OEM master - communication	Message to own address	F	SW error	a. Switch analyzer off/on b. Reload operating software c. If error recurs, call Technical Support	No
0011	OEM master - communication	Message to undefined node	F	SW error	a. Switch analyzer off/on b. Reload operating software c. If error recurs, call Technical Support	No
0015	OEM master - communication	Undefined module identifier	F	SW error	a. Switch analyzer off/on b. Reload operating software c. If error recurs, call Technical Support	No
	Disks:					
0020	OEM master - memory	Checksum error in Flash disk file	F	Flash EPROM; Flash EPROM / SRAM controller; PCB OEM master	a. Reload operating software	N/A
0021	OEM master - memory	No access to SRAM disk	F	SRAM; Flash EPROM /SRAM controller; PCB OEM master	a. Switch analyzer off/on b. If error recurs, call Technical Support	No
0022	OEM master - memory	Checksum error in SRAM disk file	F	SRAM; battery; Flash EPROM /SRAM controller; PCB OEM master	a. Reload Reference data disk b. Perform system volume determination MAINTENANCE -> SERVICE -> SYSTEM VOLUME CHECK) c. Calibrate all tests d. If error recurs call Technical Support	N/A
0025	OEM master - floppy disk	Floppy read failure	E	Floppy controller; floppy drive; PCB OEM master	a. Check that disk is inserted properly b. Verify that disk is not damaged c. Verify that disk is an Elecsys 1010 disk d. Try to read disk on an IBM-AT compatible computer e. Clean disk drive using commonly available disk drive cleaning tools	N/A

0026	OEM master - floppy disk	Floppy write failure	E	Floppy controller; floppy drive; PCB OEM master	a. Verify that disk is inserted properly b. Check that disk is 1.44 MB DS/HS type c. Format disk d. Verify that floppy disk LED is illuminated at disk access	N/A
	External Printer:					
0040	External printer timeout	External printer timeout	E	External printer; cable PC10; PCB OEM master	a. Verify printer settings (UTILITIES -> INSTRUMENT SETUP) b. Verify that printer is online c. Check printer cable d. Consult printer documentation	N/A
0041	External printer error	External printer in error state	E	See 0040	a. Verify printer settings (UTILITIES -> INSTRUMENT SETUP) b. Verify that printer is online c. Check printer cable d. Consult printer documentation	N/A
	Internal Printer:					
0050	Internal printer timeout	Internal printer timeout	E	Internal printer; fuse 5V printer; cable PC2; PCB OEM master	a. Switch analyzer off/on b. Verify printer settings (UTILITIES -> INSTRUMENT SETUP)	N/A
0051	Internal printer error	Internal printer in error state	E	See 0050	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
	Host / LSM Interface:					
0060	OEM master - host interface	Host / LSM does not answer to enquire, acknowledge, not acknowledge	1..5: W 6: E	Host / LSM; cable PC9; cable to Host / LSM; PCB OEM master	a. Switch analyzer off/on b. Check HOST ready c. Check HOST connection cable d. Check interface settings (UTILITIES -> INTERFACE SETTINGS)	N/A
0061	OEM master - host interface	Gaps in Host / LSM message	E	See 0060	a. Retry action b. Verify that HOST is online and ready	N/A
0062	OEM master - host interface	Checksum error in Host / LSM message	1..5: W 6: E	See 0060	a. Switch analyzer off/on b. Check HOST ready c. Check HOST connection cable d. Check interface settings (UTILITIES -> INTERFACE SETTINGS)	N/A

0063	OEM master - host interface	Checksum error in Instrument message frame	W	Cable PC9; cable to Host / LSM; PCB OEM master	a. Switch analyzer off/on b. Check HOST ready c. Check HOST connection cable d. Check interface settings (UTILITIES -> INTERFACE SETTINGS)	N/A
0070	OEM master - host interface	LSM response with termination code E	E	SW error	a. Switch analyzer off/on b. Reload operating software c. If error recurs, call Technical Support	N/A
0071	OEM master - host interface	LSM query response with termination code Q	E	SW error	a. Switch analyzer off/on b. Reload operating software c. If error recurs, call Technical Support	N/A
0072	OEM master - host interface	Record not implemented	E	Record sent from Host/LSM is not implemented	a. Call Technical Support	N/A
0073	OEM master - host interface	Query not implemented	E	Manufacturer Specific Record with Query sent from Host/LSM is not implemented	a. Call Technical Support	N/A
0074	OEM master - host interface	Syntax error in ASTM record	E	Record sent from Host/LSM is implemented, but it's contents is not in accordance with the Host/LSM interface specification.	a. Call Technical Support	N/A
0080	OEM master - host interface	Sample / control memory full	E	No memory available in database for requested sample/control.	a. Transfer all processed sample/control results into sample/control history.	N/A
0081	OEM master - host interface	Sample / control order memory full	E	No memory available in database for requested sample/control order.	a. Transfer all processed sample/control results into sample/control history.	N/A
0082	OEM master - host interface	Position is occupied by pending sample	E	Order with sample ID requests an occupied position via Host/LSM.	a. Use a position not currently occupied by a pending sample. b. Use same position after operation has been finished	N/A
0083	OEM master - host interface	Both STAT positions are occupied	E	Order with sample ID requests an occupied STAT position via Host/LSM.	a. Wait until samples at STAT positions are processed	N/A
0084	OEM master - host interface	Priority change of already existing sample	E	Sample ID / STAT ID already ordered or results available.	a. Wait until Sample ID / STAT ID is processed	N/A
0085	OEM master - host interface	No generation of ordered test is scanned yet	E	A test is ordered by Host/LSM but not any Test RackPack of the ordered test (any generation of that test) has been scanned.	a. Scan Test RackPack of ordered test. The ordered and scanned test generation may differ.	N/A

0086	OEM master - host interface	Control not useable for required test	E	A Control was requested for a test, but the Control is not applicable for required test generation, because a. No control scheme is defined for the requested test, or b. No control is existing for the requested test, or c. No control card was scanned.	a. Define control scheme for the requested test. b. Scan control and control card	N/A
0087	OEM master - host interface	Dilution not available for requested test	E	A dilution was requested for a test, but the Dilution RackPack for that test has not already been scanned; The test is not dilutable	a. if test is dilutable, scan a dilution RackPack for requested test b. if test is not dilutable, call Technical Support for Host/LSM	N/A
0088	OEM master - host interface	Download not possible in current system status	E	Host/LSM tried to send instrument configuration data during operation	a. Repeat download after operation has been finished	N/A
0089	OEM master - host interface	Download of reagent substance data although timeout is finished	W	Download of reagent substance data after run initialization.	a. Call Technical Support	N/A
0090	OEM master - host interface	Download position already used	E	An order without sample ID requests an occupied position via Host/LSM.	a. Wait until position is processed b. Download another position.	N/A
	CAN Bus:					
0183	OEM master - module communication	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
0185	OEM master - module communication	CAN bus warning	F	Fuse 15 V base print 1-7; Fuse -15 V base print 1-7; PCB OEM master; PCB motherboard; cables D6, M9, M10, S5, R2, R27, PC1, NT1; PCB detection module input plug; PCB detection module distribution; PCB detection module B1; PCB dilutor sipper; PCB temperature module B3; PCB rotor / rotor B4; PCB dilutor sample / reagent; PCB clot detection; PCB distribution incubation rotor; PCB incubator module B6	a. Switch analyzer off/on b. If error recurs call Technical Support	No
0188	OEM master - module communication	Unknown Command	E	SW error	a. Reinstall operating software	No

7.1.4 Detection Module

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Voltages:					
1003	Detection module - voltage	15 VDC out of 5% range	W	See 1009	No action required	N/A
1004	Detection module - voltage	-15 VDC out of 5% range	W	See 1005	No action required	N/A
1005	Detection module - voltage	-15 VDC out of 20% range	F	Fuse -15 V; Power supply; Cables NT1, M9, M10; PCB motherboard; PCB detection module input plug; PCB detection module distribution; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1009	Detection module - voltage	15 VDC out of 20% range	F	Fuse 15 V; Power supply; Cables NT1, M9, M10; PCB motherboard; PCB detection module input plug; PCB detection module distribution; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	CAN-Bus:					
1010	Detection module - communication	Message to own address	F	Firmware error	a. Reinstall operating software	No
1011	Detection module - communication	Message to undefined node	F	Firmware error	a. Reinstall operating software	No
1012	Detection module - communication	Buffer overflow	F	Firmware error	a. Reinstall operating software	No
1013	Detection module - communication	Bus error; error registered	F	See 0185	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1014	Detection module - communication	Bus error; error not registered	F	See 1013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Memory:					
1023	Detection module - memory	EPROM checksum error	F	EPROM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
1024	Detection module - memory	Flash EPROM checksum error	F	Flash EPROM; PCB controller; micro controller	a. Reinstall operating software	N/A
1025	Detection module - memory	RAM read / write error	F	RAM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
1026	Detection module - memory	Wrong firmware program loaded	F		a. Reinstall operating software	N/A

1027	Detection module - memory	EEPROM checksum error	F	EEPROM; PCB detection module B1; PCB controller	a. Call Technical Support	N/A
1028	Detection module - memory	EEPROM communication error	F	EEPROM; PCB controller; PCB detection module B1; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
	Internal Errors:					
1030	Detection module-internal error	Unknown command	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
1031	Detection module-internal error	Unknown parameter	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
1032	Detection module-internal error	Parameter out of range	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
1040	Detection module-internal error	Several concurrent measurement / voltage setting commands	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
1041	Detection module-internal error	Several concurrent magnet motor commands	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
	Magnet Drive:					
1050	Detection module - magnet drive	Drive not initialized	F	SW error	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1051	Detection module - magnet drive	Photo coupler at init. position not reached by magnet drive	F	Spindle got jammed; motor magnet drive; photo coupler; cables M6, M7; PCB potentiostat / motor; PCB distribution detection module; PCB detection module B1; Fuse 24 V	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1052	Detection module - magnet drive	Photo coupler at cell not reached	F	See 1051; Cable M8 instead of M7	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1053	Detection module - magnet drive	Photo coupler at cell not leaved towards cell	F	See 1052	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1054	Detection module - magnet drive	Photo coupler at init. position and at cell are both dark	F	Photo coupler; cables M7, M8; PCB potentiostat / motor; PCB distribution detection module; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Cell / PMT:					
1060	Detection module - Cell/PMT	High voltage out of range	F	PMT; cable M4; PCB preamplifier high voltage; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No

1061	Detection module - Cell/PMT	Cell voltage (RE - AE) out of range	F	Cell; cable M5; PCB potentiostat / motor; PCB distribution detection module; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1063	Detection module - Cell/PMT	Cell current too high	F	Cell; cable M5; PCB potentiostat / motor; PCB distribution detection module; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1064 1065 1066	Detection module - Cell/PMT	ADC PMT does not answer	F	PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1067	Detection module - Cell/PMT	Cell voltage parameter higher than 2 V	F	Wrong firmware version loaded; SW error	a. Reinstall operating software b. If error recurs call Technical Support	No
1100	Detection module - Cell/PMT	Cell current out of range during prepare cycle	F	Cell; Cable M5; PCB potentiostat / motor; PCB distribution detection module; PCB detection module B1	a. Perform UTILITIES -> MAINTENANCE -> CLEANING 2 (INTENSIV)	No
1101	Detection module - Cell/PMT	Cell current too low during system volume determination	F	See 1100	a. Perform UTILITIES -> MAINTENANCE -> CLEANING 2 (INTENSIV)	N/A
1110	Detection module - Cell/PMT	Effective Signal of current measurement too low after very high effective signal of previous measurement	W	Signal difference greater than specified cell carry over	a. Perform UTILITIES -> MAINTENANCE -> CLEANING 2 (INTENSIV)	Yes
1115	Detection module - Cell/PMT	Mean dark signal out of range	1,2: E 3: F	PMT; PCB preamplifier measurement; cables M1, M2; PCB detection module B1	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1116	Detection module - Cell/PMT	Standard deviation of raw dark signals too high	1,2: E 3: F	see 1115	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	CAN Bus:					
1180	Detection module - communication	Module does not answer to a transmission request	F	Fuse 5 V base print 1 - 7; See 0185	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1181	Detection module - communication	Module does not answer to a frame request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1182	Detection module - communication	Module does not request next frame	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1183	Detection module - communication	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
1184	Detection module - communication	Wrong sequence of frames within module message	F	Firmware error	a. Reinstall operating software	No

1185	Detection module - communication	CAN bus warning	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
1188	Detection module - communication	Unknown Command	E	SW error	a. Reinstall operating software	No
1189	Detection module - communication	Module does not signal end of command execution	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

7.1.5 Sipper Module

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Voltages:					
2001	Sipper module - voltage	35 VDC out of +10% / -20% range	W	See 2007	No action required	N/A
2002	Sipper module - voltage	24 VDC out of 10% range	W	See 2008	No action required	N/A
2003	Sipper module - voltage	15 VDC out of 5% range	W	See 2009	No action required	N/A
2007	Sipper module - voltage	35 VDC out of +23% / -40% range	F	Fuse 35 V; Power supply; Cables NT1, S5; PCB motherboard; PCB dilutor sipper	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2008	Sipper module - voltage	24 VDC out of 25% range	F	Fuse 24 V; Power supply; Cables NT1, S5; PCB motherboard; PCB dilutor sipper	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2009	Sipper module - voltage	15 VDC out of 20% range	F	Fuse 15 V; Power supply; Cables NT1, S5; PCB motherboard; PCB dilutor sipper	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	CAN-Bus:					
2010	Sipper module - communication	Message to own address	F	Firmware error	a. Reinstall operating software	No
2011	Sipper module - communication	Message to undefined node	F	Firmware error	a. Reinstall operating software	No
2012	Sipper module - communication	Buffer overflow	F	Firmware error	a. Reinstall operating software	No
2013	Sipper module - communication	Bus error; error registered	F	See 1013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2014	Sipper module - communication	Bus error; error not registered	F	See 2013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Memory:					
2023	Sipper module - memory	EPROM checksum error	F	EPROM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
2024	Sipper module - memory	Flash EPROM checksum error	F	Flash EPROM; PCB controller; micro controller	a. Reinstall operating software	N/A
2025	Sipper module - memory	RAM read / write error	F	RAM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
2026	Sipper module - memory	Wrong firmware program loaded	F		a. Reinstall operating software	N/A
2027	Sipper module - memory	EEPROM checksum error	F	EEPROM; PCB dilutor sipper; PCB controller	a. Call Technical Support	N/A

2028	Sipper module - memory	EEPROM communication error	F	EEPROM; PCB controller; PCB dilutor sipper; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
	Internal Errors:					
2030	Sipper module - internal error	Unknown command	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
2031	Sipper module - internal error	Unknown parameter	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
2032	Sipper module - internal error	Parameter out of range	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
2040	Sipper module - internal error	Several concurrent arm commands	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
2041	Sipper module - internal error	Several concurrent dilutor or dilutor valve commands	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
	Dilutor:					
2050	Sipper module - pipettor	Dilutor not initialized	F	SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
2051	Sipper module - pipettor	Init. position not found	1,2: W 3: F	Dilutor motor belt loose or defective; photo coupler, dilutor motor; cables S1, S2; dilutor got jammed; PCB dilutor sipper	a. Verify correct syringe installation and movement b. Replace syringe c. Switch analyzer off/on d. If error recurs call Technical Support	No
2052	Sipper module - pipettor	Steps lost (Photo coupler did not reached or leave the expected position range)	1: W/E 2: F	See 2051	a. Verify correct syringe installation and movement b. Replace syringe c. Switch analyzer off/on d. If error recurs call Technical Support	No
2053	Sipper module - pipettor	Max. syringe volume exceeded	F	System volume not determined; Wrong firmware version loaded; SW error	a. Perform system volume determination (UTILITIES -> SERVICE -> SYSTEM VOLUME CHECK) b. Switch analyzer off/on c. Reinstall operating software d. If error recurs call Technical Support	No

2054	Sipper module - pipettor	Min. syringe volume exceeded	F	System volume not determined; Wrong firmware version loaded; SW error	a. Perform system volume determination (UTILITIES -> SERVICE -> SYSTEM VOLUME CHECK) b. Switch analyzer off/on c. Reinstall operating software d. If error recurs call Technical Support	No
	Arm horizontal:					
2060	Sipper module-S/R arm horizontal	Arm not initialized	F	SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
2061	Sipper module-S/R arm horizontal	Init. position not found	1,2: W 3: F	Belt loose or defective; photo coupler; horizontal arm motor; cables S5, S51, S514; arm got jammed; PCB distribution sipper; PCB motherboard; PCB dilutor sipper	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
2062	Sipper module-S/R arm horizontal	Steps lost (Mismatch between hardware and software step counter; Init. photo coupler did not reach or leave the expected position range)	1: W 2: F	See 2061; photo couplers for toothed wheel; cables S515, S516	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
	Arm vertical:					
2071	Sipper module - S/R arm vertical	Init. position not found	1,2: W 3: F	Fuse 35 V; Belt loose or defective; hall sensor; vertical arm motor; cables S5, S51, S511, S513; arm got jammed; PCB distribution sipper; PCB motherboard; PCB dilutor sipper	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
2072	Sipper module - S/R arm vertical	Steps lost (Hall sensor did not reached or leave the expected position range)	1: W/E 2: F	See 2071 except fuse	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
2073	⇒ See diversified numbers	Crash; (diversified to numbers 2160, 2161, 2163, 2169)		See 2160, 2161, 2163, 2169	See 2160 - 2169	N/A
2074	Sipper module - S/R arm vertical	Wrong cycle parameters	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No

	LLD:					
2080	⇒ See diversified numbers	No liquid found (diversified to numbers 2110, 2111, 2113, 2114)		See 2110, 2111, 2113, 2114	See 2110 - 2114	N/A
2082	⇒ See diversified numbers	Not enough rest (diversified to numbers 2120, 2121, 2123)		See 2120, 2121, 2123	See 2120 - 2123	N/A
	Dilutor Valve:					
2091	Sipper module - pipettor valve	Init. position not found	1,2: W 3: F	Fuse 35 V; Photo coupler, dilutor valve motor; cables S3, S4; PCB dilutor sipper	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2092	Sipper module - pipettor valve	Steps lost (Photo coupler signal changed outside the expected position ranges)	1:W 2: F	See 2061 except fuse	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	LLD:					
2110	ProCell empty	No liquid found in ProCell bottle	1: W 2: E	ProCell bottle empty; cables S5, S51, S519, S5191; PCB preamplifier LLD sipper; PCB LLD sipper; PCB distribution sipper; PCB motherboard; PCB dilutor sipper	a. Check ProCell bottles b. Repeat measurement with a new bottle set c. Verify proper probe installation d. Clean probe e. Perform CLEANING 1 (NORMAL) f. Replace probe	No
2111	CleanCell empty	No liquid found in CleanCell bottle	1: W 2: E	CleanCell bottle empty; cables S5, S51, S519, S5191; PCB preamplifier LLD sipper; PCB LLD sipper; PCB distribution sipper; PCB motherboard; PCB dilutor sipper	a. Check CleanCell bottles b. Repeat measurement with a new bottle set d. Verify proper probe installation e. Clean probe f. Perform CLEANING 1 (NORMAL) g. Replace probe	No
2113	No liquid in sipper rinse station	No liquid found in washing station	1: W 2: F	System water bottle empty; tubings 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 5.0, 5.1; membrane pump PWS; magnet valve VWS1; washing station WS1; water bottle; water bottle valves; water filter; see 2110 (without ProCell bottle)	a. Check water level in dest. water container b. Verify tight mounting of washing station inlets c. Verify proper probe installation d. Clean probe e. Perform CLEANING 1 (NORMAL) f. Replace probe	No
2114	Sipper rinse station not draining	Water in washing station is not lowered	1: W 2: F	Washing station WS1; tubings 4.10, 4.13, 4.5, 4.2; magnet valve VAS1	a. Verify that tubing to waste container is not bent or blocked b. Verify that waste container cap fits properly	No

2120	ProCell short	Not enough rest in ProCell bottle (deepest position reached during aspiration)	E	ProCell bottle empty	a. Use a new bottle set	No
2121	CleanCell short	Not enough rest in CleanCell bottle (deepest position reached during aspiration)	E	CleanCell bottle empty	a. Use a new bottle set	No
2123	Sip rinse station - liq.lev. low	Liquid level in washing station too low	1: W 2: F	See 2113	a. Check water level in dist. water container b. Verify tight mounting of washing station inlets c. Verify proper probe installation d. Clean probe e. Perform CLEANING 1 (NORMAL) f. Replace probe	No
2130	Sip rinse station - liq.lev. high	Liquid level in washing station too high	1: W 2: F	Washing station WS1; tubings 4.11, 4.12, 4.13, 4.5, 4.4; magnet valve VAS1	a. Verify that tubing to waste container is not bent or blocked b. Verify that waste container cap fits properly	No
2140	ProCell short	No liquid detected in ProCell bottle after aspiration	E	ProCell bottle empty	a. Use a new bottle set	No
2141	CleanCell short	No liquid detected in CleanCell bottle after aspiration	E	CleanCell bottle empty	a. Use a new bottle set	No
2150	ProCell volume changed	Liquid level ProCell not consistent with inventory	1: W 2: E	Bottle changed without operator confirmation; Extremely evaporation	a. Check and correct INVENTORY b. Use a new bottle set	N/A
2151	CleanCell volume changed	Liquid level CleanCell not consistent with inventory	1: W 2: E	Bottle changed without operator confirmation; Extremely evaporation	a. Check and correct INVENTORY b. Use a new bottle set	N/A
	Crash Sensor:					
2160	Abnormal descent - ProCell	Crash on ProCell access	1: E 2: F	ProCell bottle closed; ProCell bottle empty; arm misalignment; arm loose; buckled sipper needle; steps lost during horizontal arm movement; and see 2110	a. Check crash sensor switch 'click' by moving needle up and down b. Open bottle lid c. Check for proper bottle placement d. Verify that bottle is filled e. Verify that arm moves gently (tubing blockage)	No

2161	Abnormal descent - CleanCell	Crash on CleanCell access	1: E 2: F	CleanCell bottle closed; CleanCell bottle empty; arm misalignment; arm loose; buckled sipper needle; steps lost during horizontal arm movement; and see 2111	a. Check crash sensor switch 'click' by moving needle up and down b. Open bottle lid c. Check for proper bottle placement d. Verify that bottle is filled e. Verify that arm moves gently (tubing blockage)	No
2163	Abn.descent-sipper rinse station	Crash on washing station access	1: W 2: F	Arm misalignment; arm loose; buckled sipper needle; steps lost during horizontal arm movement	a. Check crash sensor switch 'click' by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage)	No
2169	Abnormal descent - sipper probe	Unexpected crash	1: W 2: F	Crash sensor; arm loose; broken sipper needle; cables S5, S51, S519, S51911; PCB LLD sipper; PCB distribution sipper; PCB motherboard; PCB dilutor sipper	a. Check crash sensor switch 'click' by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage)	No
2170	Assay Cup not found	Bottom of assay cup not found	1: W 2: F	Crash sensor; arm loose; broken sipper needle; cables S5, S51, S519, S51911; PCB LLD sipper; PCB distribution sipper; PCB motherboard; PCB dilutor sipper	a. Check crash sensor switch 'click' by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage) d. Verify that incubator position affected contains an AssayCup	No
2171	Assay Cup detected too soon	Bottom of assay cup found too high	1: W 2: F	Assay Cup misplaced; arm and / or rotor misalignment; arm loose; buckled sipper needle; steps lost during horizontal arm movement; steps lost during rotor movement	a. Check crash sensor switch 'click' by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage) d. Verify that incubator position affected contains an AssayCup e. Verify proper AssayCup segment placement	No
	CAN Bus:					
2180	Sipper module - communication	Module does not answer to a transmission request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2181	Sipper module - communication	Module does not answer to a frame request	F	See 2180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

2182	Sipper module - communication	Module does not request next frame	F	See 2180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2183	Sipper module - communication	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
2184	Sipper module - communication	Wrong sequence of frames within module message	F	Firmware error	a. Reinstall operating software	No
2185	Sipper module - communication	CAN bus warning	F	See 2180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2188	Sipper module - communication	Unknown Command	E	SW error	a. Reinstall operating software	No
2189	Sipper module - communication	Module does not signal end of command execution	F	See 2180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
2190	ProCell / CleanCell too high	Liquid level in ProCell or CleanCell bottle too high	F	Bottle with too much ProCell/CleanCell volume; ProCell/CleanCell bottle with much foam	a. Use a new bottle set without foam	No

7.1.6 Temperature Module

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	CAN-Bus:					
3010	Temp. module - communication	Message to own address	F	Firmware error	a. Reinstall operating software	No
3011	Temp. module - communication	Message to undefined node	F	Firmware error	a. Reinstall operating software	No
3012	Temp. module - communication	Buffer overflow	F	Firmware error	a. Reinstall operating software	No
3013	Temp. module - communication	Bus error; error registered	F	See 1013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3014	Temp. module - communication	Bus error; error not registered	F	See 3013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Memory:					
3023	Temp. module - memory	EPROM checksum error	F	EPROM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
3024	Temp. module - memory	Flash EPROM checksum error	F	Flash EPROM; PCB controller; micro controller	a. Reinstall operating software	N/A
3025	Temp. module - memory	RAM read / write error	F	RAM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
3026	Temp. module - memory	Wrong firmware program loaded	F		a. Reinstall operating software	N/A
3027	Temp. module - memory	EEPROM checksum error	F	EEPROM; PCB temperature module B3; PCB controller	a. Call Technical Support	N/A
3028	Temp. module - memory	EEPROM communication error	F	EEPROM; PCB controller; PCB temperature module B3; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
3029	Temp. module - memory	EEPROM magic number not set	F	Not initialised EEPROM; data lost	a. Call Technical Support	N/A
	Internal Errors:					
3030	Temp. module - internal error	Unknown command	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
3031	Temp. module - internal error	Unknown parameter	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No

3032	Temp. module - internal error	Parameter out of range	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
3033	Temp. module - internal error	Several concurrent temperature control commands	F	Wrong firmware version loaded; SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
	PCBs Preamplifier:					
3040	Temp. module - preamp. memory	EEPROM temperature bottle block 1 checksum error	F	EEPROM temperature bottle block 1	a. Call Technical Support	N/A
3041	Temp. module - preamp. memory	EEPROM temperature bottle block 2 checksum error	F	EEPROM temperature bottle block 2	a. Call Technical Support	N/A
3042	Temp. module - preamp. memory	EEPROM preheater sipper checksum error	F	EEPROM preheater sipper	a. Call Technical Support	N/A
3043	Temp. module - preamp. memory	EEPROM temperature detection module checksum error	F	EEPROM temperature detection module	a. Call Technical Support	N/A
3050	Temp. module - preamp. memory	EEPROM temperature bottle block 1 magic number not set	F	Not initialized EEPROM; data lost	a. Call Technical Support	N/A
3051	Temp. module - preamp. memory	EEPROM temperature bottle block 2 magic number not set	F	Not initialized EEPROM; data lost	a. Call Technical Support	N/A
3052	Temp. module - preamp. memory	EEPROM preheater sipper magic number not set	F	Not initialized EEPROM; data lost	a. Call Technical Support	N/A
3053	Temp. module - preamp. memory	EEPROM temperature detection module magic number not set	F	Not initialized EEPROM; data lost	a. Call Technical Support	N/A
3060	Temp. module - preheater failure	EEPROM temperature bottle block 1 communication error	F	EEPROM; cable T1; PCB preamplifier temperature bottle block 1; PCB temperature module B3; PCB motherboard	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
3061	Temp. module - preheater failure	EEPROM temperature bottle block 2 communication error	F	EEPROM; cable T1; PCB preamplifier temperature bottle block 2; PCB temperature module B3; PCB motherboard	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A

3062	Temp. module - preheater failure	EEPROM preheater sipper communication error	F	EEPROM; cable T1; PCB preamplifier preheater sipper; PCB temperature module B3; PCB motherboard	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
3063	Temp. module - preheater failure	EEPROM temperature detection module communication error	F	EEPROM; cable T1; PCB preamplifier temperature detection module; PCB temperature module B3; PCB motherboard	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
3070	Temp. module - preheater failure	ADC temperature bottle block 1 communication error	F	See 3060; ADC instead of EEPROM	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3071	Temp. module - preheater failure	ADC temperature bottle block 2 communication error	F	See 3061; ADC instead of EEPROM	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3072	Temp. module - preheater failure	ADC preheater sipper communication error	F	See 3062; ADC instead of EEPROM	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3073	Temp. module - preheater failure	ADC temperature detection module communication error	F	See 3063; ADC instead of EEPROM	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Temperature Control:					
3080	Temperature control failure	Temperature control for bottle block 1 too long at limit	F	Peltier bottle block 1; fuse +15 V Peltier bottle block 1; cable T2; PCB temperature module B3; PCB motherboard	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No
3081	Temperature control failure	Temperature control for bottle block 2 too long at limit	F	Peltier bottle block 2; fuse +15 V Peltier bottle block 2; cable T2; PCB temperature module B3; PCB motherboard	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No
3082	Temperature control failure	Temperature control for preheater sipper too long at limit	F	Peltier preheater sipper; fuse +15 V Peltier preheater sipper; cable T2; PCB temperature module B3; PCB motherboard	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No
3083	Temperature control failure	Temperature control for detection module too long at limit	F	Peltiers detection module; fuse +15 V Peltier detection module; cables T2; PCB temperature module B3; PCB clot detection B7; PCB motherboard	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No

	Temperatures:					
3100	Temp. block 1 out of range	Temperature of bottle block 1 out of range	W	See 3080	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	Yes
3101	Temp. block 2 out of range	Temperature of bottle block 2 out of range	W	See 3081	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	Yes
3102	Temp. preheater out of range	Temperature preheater sipper out of range between Pick Up and Transport	W	See 3082	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	Yes
3103	Temp. detection unit out of range	Temperature detection unit out of range	W	See 3083	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	Yes
3104	Temp. preheater out of wide range	Temperature preheater sipper out of wide range between Pick Up and Transport	E	See 3082	a. Check fan and filter b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No
	Miscellaneous Sensors:					
3150	Liquid waste full	Waste nearly full	E	Waste not emptied before run; waste sensor; cables T1, T121; PCB waste level; PCB motherboard; PCB temperature module B3	a. Empty waste container b. Clean waste container cap and sensor	No
	CAN Bus:					
3180	Temp. module – communication	Module does not answer to a transmission request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3181	Temp. module – communication	Module does not answer to a frame request	F	See 3180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3182	Temp. module – communication	Module does not request next frame	F	See 3180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

3183	Temp. module – communication	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
3184	Temp. module – communication	Wrong sequence of frames within module message	F	Firmware error	a. Reinstall operating software	No
3185	Temp. module – communication	CAN bus warning	F	See 3180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
3188	Temp. module – communication	Unknown Command	E	SW error	a. Reinstall operating software	No
3189	Temp. module – communication	Module does not signal end of command execution	F	See 3180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

7.1.7 Rotor / Rotor Module

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Voltages:					
4001	S/R disk / l. disk - voltage	35 VDC out of +10% / -20% range	W	See 4007	No action required	N/A
4002	S/R disk / l. disk - voltage	24 VDC out of 10% range	W	See 4008	No action required	N/A
4003	S/R disk / l. disk - voltage	15 VDC out of 5% range	W	See 4009	No action required	N/A
4007	S/R disk / l. disk - voltage	35 VDC out of +23% / -40% range	F	Fuse 35 V; Power supply; Cables NT1, D6; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4008	S/R disk / l. disk - voltage	24 VDC out of 25% range	F	Fuse 24 V; Power supply; Cables NT1, D6; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4009	S/R disk / l. disk - voltage	15 VDC out of 20% range	F	Fuse 15 V; Power supply; Cables NT1, D6; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	CAN-Bus:					
4010	S/R disk / l. disk - commun.	Message to own address	F	Firmware error	a. Reinstall operating software	No
4011	S/R disk / l. disk - commun.	Message to undefined node	F	Firmware error	a. Reinstall operating software	No
4012	S/R disk / l. disk - commun.	Buffer overflow	F	Firmware error	a. Reinstall operating software	No
4013	S/R disk / l. disk - commun.	Bus error; error registered	F	See 1013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4014	S/R disk / l. disk - commun.	Bus error; error not registered	F	See 4013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Memory:					
4023	S/R disk / l. disk - memory	EPROM checksum error	F	EPROM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
4024	S/R disk / l. disk - memory	Flash EPROM checksum error	F	Flash EPROM; PCB controller; micro controller	a. Reinstall operating software	N/A
4025	S/R disk / l. disk - memory	RAM read / write error	F	RAM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
4026	S/R disk / l. disk - memory	Wrong firmware program loaded	F		a. Reinstall operating software	N/A

4027	S/R disk / I. disk – memory	EEPROM checksum error	F	EEPROM; PCB dilutor sample / reagent; PCB controller	a. Call Technical Support	N/A
4028	S/R disk / I. disk - memory	EEPROM communication error	F	EEPROM; PCB controller; PCB dilutor sample / reagent; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
	Internal Errors:					
4030	S/R disk/I.disk-internal error	Unknown command	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
4031	S/R disk/I.disk-internal error	Unknown parameter	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
4032	S/R disk/I.disk-internal error	Parameter out of range	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
4033	S/R disk/I.disk-internal error	Wrong pump parameters	F	Pump performances not adjusted	a. Call Technical Support	No
4040	S/R disk/I.disk-internal error	Several concurrent sample reagent rotor commands	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
4041	S/R disk/I.disk-internal error	Several concurrent incubation rotor commands	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
4042	S/R disk/I.disk-internal error	Several concurrent commands for washing pump PWS	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
4043	S/R disk/I.disk-internal error	Several concurrent commands for washing pump PWD	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No

	Sample Reagent Rotor:					
4050	S/R disk - movement	Rotor not initialized	F	SW error	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4051	S/R disk - movement	Init. position not found	1,2: W 3: F	Fuse 35 V; Belt loose or defective; photo coupler; rotor motor; cables R1, R11, R12; rotor got jammed; PCB distribution sample reagent rotor; PCB motherboard; PCB rotor / rotor B4	a. Switch analyzer off/on b. Verify free disk movement c. If error recurs call Technical Support	No
4052	S/R disk - movement	Steps lost (Mismatch between hardware and software step counter; Init. photo coupler did not reach or leave the expected position range)	1: W/E 2: F	See 4051 except fuse; photo couplers for the toothed wheel; cables R13, R14	a. Switch analyzer off/on b. Verify free disk movement c. If error recurs call Technical Support	No
4053	S/R disk missing	Rotor not plugged in	E	Sample reagent rotor not on instrument; photo coupler; cables R1, R17; PCB distribution sample reagent rotor; PCB motherboard; PCB rotor / rotor B4	a. Insert sample/reagent disk b. Verify that disk is inserted properly c. Clean photosensor in disk compartment	No
4054	S/R disk - movement	Fan defective	F	Fan; cables R1, R16; PCB distribution sample reagent rotor; PCB motherboard; PCB rotor / rotor B4	a. Verify that fan is not blocked	No
	Incubation Rotor:					
4060	Incubation disk - movement	Rotor not initialized	F	SW error	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4061	Incubation disk - movement	Init. position not found	1,2: W 3: F	Fuse 35 V; Belt loose or defective; photo couplers; rotor motor; cables R2, R21, R22, R25; rotor got jammed; PCB distribution incubation rotor; PCB motherboard; PCB rotor / rotor B4	a. Switch analyzer off/on b. Verify free incubator movement c. If error recurs call Technical Support	No
4062	Incubation disk - movement	Steps lost (Mismatch between hardware and software step counter; Init. photo coupler did not reach or leave the expected position range)	1: W 2: F	See 4061 except fuse; photo couplers for the toothed wheel; cables R23, R24	a. Switch analyzer off/on b. Verify free incubator movement c. If error recurs call Technical Support	No
	CAN Bus:					
4180	S/R disk / I. disk - commun.	Module does not answer to a transmission request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4181	S/R disk / I. disk - commun.	Module does not answer to a frame request	F	See 4180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

4182	S/R disk / I. disk - commun.	Module does not request next frame	F	See 4180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4183	S/R disk / I. disk - commun.	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
4184	S/R disk / I. disk - commun.	Wrong sequence of frames within module message	F	Firmware error	a. Reinstall operating software	No
4185	S/R disk / I. disk - commun.	CAN bus warning	F	See 4180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
4188	S/R disk / I. disk - commun.	Unknown Command	E	SW error	a. Reinstall operating software	No
4189	S/R disk / I. disk - commun.	Module does not signal end of command execution	F	See 4180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Voltages:					
5001	S/R arm, probe, pipettor-voltage	35 VDC out of +10% / -20% range	W	See 5007	No action required	N/A
5002	S/R arm, probe, pipettor-voltage	24 VDC out of 10% range	W	See 5008	No action required	N/A
5003	S/R arm, probe, pipettor-voltage	15 VDC out of 5% range	W	See 5009	No action required	N/A
5007	S/R arm, probe, pipettor-voltage	35 VDC out of +23% / -40% range	F	Fuse 35 V; Power supply; Cables NT1, D6; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5008	S/R arm, probe, pipettor-voltage	24 VDC out of 25% range	F	Fuse 24 V; Power supply; Cables NT1, D6; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5009	S/R arm, probe, pipettor-voltage	15 VDC out of 20% range	F	Fuse 15 V; Power supply; Cables NT1, D6; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	CAN-Bus:					
5010	S/R arm, probe, pipettor - commun.	Message to own address	F	Firmware error	a. Reinstall operating software	No
5011	S/R arm, probe, pipettor - commun.	Message to undefined node	F	Firmware error	a. Reinstall operating software	No
5012	S/R arm, probe, pipettor – commun.	Buffer overflow	F	Firmware error	a. Reinstall operating software	No
5013	S/R arm, probe, pipettor - commun.	Bus error; error registered	F	See 1013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5014	S/R arm, probe, pipettor - commun.	Bus error; error not registered	F	See 5013	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Memory:					
5023	S/R arm, probe, pipettor – memory	EPROM checksum error	F	EPROM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
5024	S/R arm, probe, pipettor – memory	Flash EPROM checksum error	F	Flash EPROM; PCB controller; micro controller	a. Reinstall operating software	N/A
5025	S/R arm, probe, pipettor – memory	RAM read / write error	F	RAM; PCB controller; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
5026	S/R arm, probe, pipettor – memory	Wrong firmware program loaded	F		a. Reinstall operating software	N/A

5027	S/R arm, probe, pipettor – memory	EEPROM checksum error	F	EEPROM; PCB dilutor sample / reagent; PCB controller	a. Call Technical Support	N/A
5028	S/R arm, probe, pipettor – memory	EEPROM communication error	F	EEPROM; PCB controller; PCB dilutor sample / reagent; micro controller	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
	Internal Errors:					
5030	S/R module – internal error	Unknown command	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
5031	S/R module – internal error	Unknown parameter	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
5032	S/R module - internal error	Parameter out of range	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
5033	S/R module - internal error	Wrong pump parameters	F	Pump performances not adjusted	a. Call Technical Support	No
5040	S/R module - internal error	Several concurrent arm commands	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
5041	S/R module - internal error	Several concurrent dilutor or dilutor valve or rinsing pump commands	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
5042	S/R module - internal error	Several concurrent bead mixer commands	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
	Dilutor:					
5050	S/R pipettor - movement	Dilutor not initialized	F	SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
5051	S/R pipettor - movement	Init. position not found	1,2: W 3: F	Dilutor motor belt loose or defective; photo coupler, dilutor motor; cables D1, D3; dilutor got jammed; PCB dilutor sample / reagent	a. Verify correct syringe installation and movement b. Replace syringe c. Switch analyzer off/on d. If error recurs call Technical Support	No
5052	S/R pipettor - movement	Steps lost (Photo coupler did not reach or leave the expected position range)	1: W/E 2: F	See 5051	a. Verify correct syringe installation and movement b. Replace syringe c. Switch analyzer off/on d. If error recurs call Technical Support	No
5053	S/R pipettor - movement	Max. syringe volume exceeded	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No
5054	S/R pipettor - movement	Min. syringe volume exceeded	F	Wrong firmware version loaded; SW error	a. Reinstall operating software	No

5055	S/R pipettor - clot detect.	Dilutor or pump stopped by clot module	E	Pressure too high	a. Remove probe and clean it using an ultrasonic bath at 35 °C b. Exchange probe c. Exchange probe tubing	No
	Arm horizontal:					
5060	S/R arm - horizontal movement	Arm not initialized	F	SW error	a. Switch analyzer off/on b. Reinstall operating software c. If error recurs call Technical Support	No
5061	S/R arm - horizontal movement	Init. position not found	1,2: W 3: F	Belt loose or defective; photo coupler; horizontal arm motor; cables D6, D61, D614; arm got jammed; PCB distribution sample reagent; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
5062	S/R arm - horizontal movement	Steps lost (Mismatch between hardware and software step counter; Init. photo coupler did not reach or leave the expected position range)	1: W 2: F	See 5061; photo couplers for the toothed wheel; cables D615, D616	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
	Arm vertical:					
5071	S/R arm - vertical movement	Init. position not found	1,2: W 3: F	Fuse 35 V; Belt loose or defective; hall sensor; vertical arm motor; cables D6, D61, D611, D613; arm got jammed; PCB distribution sample reagent; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
5072	S/R arm - vertical movement	Steps lost (Hall sensor did not reached or leave the expected position range)	1: W/E 2: F	See 5071 except fuse	a. Switch analyzer off/on b. Check free movement of arm (proper tubing connection) manually c. If error recurs call Technical Support	No
5073	⇒ See diversified numbers	Crash detection needle; (diversified to numbers 5160, 5161, 5162, 5163, 5169)		See 5160, 5161, 5162, 5163, 5169	See 5160 - 5169	N/A
5074	⇒ See diversified numbers	Crash detection bead mixer; (diversified to numbers 5175, 5176)		See 5175, 5176	See 5175, 5176	N/A

5075	⇒ See diversified numbers	Crash detection needle; (transformed to number 5165)		See 5165	See 5165	N/A
	LLD:					
5080	⇒ See diversified numbers	No liquid found (diversified to numbers 5110, 5111, 5112, 5113, 5114)		See 5110, 5111, 5112, 5113, 5114	See 5110 - 5114	N/A
5081	S/R module - internal error	Liquid level found is not constant enough	F	Wrong firmware version loaded; SW error	a. Install operating software update (old version loaded)	No
5082	⇒ See diversified numbers	Not enough rest (diversified to numbers 5120, 5121, 5122, 5123)		See 5120, 5121, 5122, 5123	See 5120 - 5123	N/A
	Dilutor Valve:					
5091	S/R module - pipettor valve	Init. position not found	1,2: W 3: F	Fuse 35 V; Photo coupler, dilutor valve motor; cables D2, D4; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5092	S/R module - pipettor valve	Steps lost (Photo coupler signal changed outside the expected position ranges)	1: W 2: F	See 5091 except fuse	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Bead Mixer:					
5095	S/R module - mixer error	Mixer motor current too high	1,2: W 3: F	Bead mixer got jammed; see 5096	a. Verify that bead mixer is not mechanical blocked b. Use new reagent pack	No
5096	S/R module - mixer error	Mixer motor current too low	1: W 2: F	Bead mixer motor; bead mixer motor; cables D6, D61, D617, D61713; PCB LLD sample / reagent; PCB distribution sample reagent; PCB motherboard; PCB dilutor sample / reagent	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	LLD:					
5110	S/R module - assay reagent short	No liquid found in Reagent Pack bottle	1: W 2: E	Reagent Pack bottle empty; arm misalignment; Cables D6, D61, D617, D6171; PCB preamplifier LLD sample / reagent; PCB LLD sample / reagent; PCB distribution sample reagent; PCB motherboard; PCB dilutor sample / reagent	a. Call up RESULTS to get the position b. Check reagent pack c. Repeat measurement with a new reagent pack d. Verify proper probe installation e. Clean probe f. Perform CLEANING 1 (NORMAL) g. Replace probe	No

5111	S/R module – sample short	No liquid found in sample tube / cup	1: W 2: E	See 5110; sample tube / cup instead of Reagent Pack bottle	a. Find sample cup position affected in RESULTS b. Check sample volume c. Verify proper probe mounting d. Repeat measurement	No
5112	S/R module-no liquid in Assay Cup	No liquid found in assay cup	1: W 2: E 3: F	See 5110; pipetting error instead of Reagent Pack empty; incubation disk grounding	a. Check for foam in sample cup in relation to other sample cups b. Repeat measurement using sample with sufficient sample material volume	No
5113	No liquid in S/R rinse station	No liquid found in WD1/2	1: W 2: F	System water bottle empty; tubings 3.0, 3.6, 3.7, 5.0, 5.1; membrane pump PWD; water bottle; water bottle valves; water filter; see 5110 (without Reagent Pack bottle) WD1: magnet valve VWD1; tubings 3.8, 3.15, 3.16; washings station WD1 WD2: magnet valve VWD2; tubings 3.9, 3.13, 3.14; washings station WD2	a. Check water level in dest. water container b. Verify tight mounting of washing station inlets c. Verify proper probe installation d. Clean probe e. Perform CLEANING 1 (NORMAL) f. Replace probe	No
5114	S/R rinse station not drainnig	Water in washing station WD1/2 is not lowered	1: W 2: F	WD1: Washing station WD1; tubings 4.14, 4.8, 4.2; pinch valve VAD1 WD2: Washing station WD2; tubings 4.18, 4.7, 4.1; magnet valve VAD2	a. Verify that tubing to waste container is not bent or blocked b. Verify that waste container cap fits properly	No
5115	S/R probe dirty	Liquid in Reagent Pack found on retry (needle completely soiled)	F	See 5110	a. Clean probe in an ultrasonic bath	No
5116	S/R probe dirty	Liquid in sample found on retry (needle completely soiled)	F	See 5111	a. Clean probe in an ultrasonic bath	No
5120	S/R module - reagent pack empty	Not enough rest in Reagent Pack bottle	E	Reagent Pack empty; arm misalignment	a. Repeat measurement with new reagent pack	No
5121	S/R module - sample short	Not enough sample rest	E	Sample tube / cup empty; arm misalignment	a. Repeat measurement with sufficient sample material	No
5122	Reaction mixture short	Not enough in assay cup	1: E 2: F	Pipetting error; arm misalignment; incubation disk grounding	a. Check for foam in sample cup in relation to other sample cups b. Repeat measurement with foam free sample	No

5123	S/R rinse station - liq.lev. low	Liquid level in washing station WD1/2 too low	1: W 2: F	See 5113	a. Check water level in dest. water container b. Verify tight mounting of washing station inlets c. Verify proper probe installation d. Clean probe e. Perform CLEANING 1 (NORMAL) f. Replace probe	No
5125	S/R module - sample short	Calculated descent of needle during aspiration too high	E	Sample cup empty; wrong adapter or tube / cup type setting.	a. Check adapter and tube / cup type setting. b. Repeat measurement with sufficient sample material	No
5130	S/R rinse station - liq.lev. high	Liquid level in washing station WD1/2 too high	1: W 2: F	WD1: Washing station WD1; tubings 4.15, 4.16, 4.17, 4.8, 4.2; pinch valve VAD1 WD2: Washing station WD2; tubings 4.19, 4.20, 4.21, 4.7, 4.1; magnet valve VAD2	a. Verify that tubing to waste container is not bent or blocked b. Verify that waste container cap fits properly	No
5140	S/R module - reagent pack empty	No liquid detected in Reagent Pack after aspiration	E	Reagent Pack empty	a. Use new reagent pack	No
5141	S/R module - sample short	No liquid detected in sample tube / cup after aspiration	E	Sample tube / cup empty	a. Find sample position in RESULTS b. Repeat measurement with sufficient sample material	No
5142	Reaction mixture short	No liquid detected in assay cup after aspiration	1: E 2: F	Pipetting error	a. Check for foam in sample cup in relation to other sample cups b. Repeat measurement with foam free sample	No
5150	Invalid liq. lev.for reagent pack	Liquid level Reagent Pack not consistent with inventory	1: W 2: E	Reagent Pack used on other system without LSM connection; Reagent Pack refilled; Extremely evaporation	a. Use new reagent pack	N/A

	Crash Sensors:					
5160	S/R probe abn. descent	Needle crash on Reagent Pack access	1: W/E 2: E	Reagent Pack cap closed; Reagent Pack bottle empty; arm and / or rotor misalignment; arm loose; buckled sample reagent needle; steps lost during horizontal arm movement; steps lost during rotor movement; and see 5110	a. Check crash sensor switch 'click' by moving needle up and down b. Open rack pack lids c. Check for proper pack placement d. Verify that pack is filled e. Verify that arm moves gently (tubing blockage)	No
5161	Abnormal descent - sample	Needle crash on sample access	1: W/E 2: E	Sample tube with cap; sample tube / cup empty; arm and / or rotor misalignment; arm loose; buckled sample reagent needle; steps lost during horizontal arm movement; steps lost during rotor movement; and see 5111	a. Verify that cup is not closed with a lid or film b. Ensure free access to sample cup c. Check crash sensor switch 'click' by moving needle up and down	No
5162	Abnormal descent - Assay Cup	Needle crash on assay cup access	1: W/E 2: F	Arm and / or rotor misalignment; assay cup empty; arm loose; buckled sample reagent needle; steps lost during horizontal arm movement; steps lost during rotor movement; and see 5112	a. Validate that the AssayCup segments are loaded properly. b. Check for foam in sample cup in relation to other sample cups. Repeat measurement using sample with sufficient sample volume	No
5163	Abn.descent - S/R rinse station	Needle crash on washing station WD1/2 access	1: W 2: F	Arm misalignment; arm loose; buckled sample reagent needle; steps lost during horizontal arm movement; steps lost during rotor movement;	a. Check crash sensor switch 'click' by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage)	No
5165	Abnormal descent - sample	Needle crash on sample access in cup on tube	1: W/E 2: E	Sample cup empty; arm and / or rotor misalignment; arm loose; buckled sample reagent needle; steps lost during horizontal arm movement; steps lost during rotor movement; and see 5111	a. Verify that cup is not closed with a lid or film b. Ensure free access to sample cup c. Check crash sensor switch 'click' by moving needle up and down	No
5169	Abnormal descent - S/R probe	Unexpected needle crash	1: W 2: F	Crash sensor; cables D6, D61, D617, D61714; PCB LLD sample reagent; PCB distribution sample reagent; PCB motherboard; PCB dilutor sample reagent	a. Check crash sensor switch 'click' by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage)	No

5170	Abnormal descent - micro particle	Bottom of bead bottle not found	1: W 2: F	Crash sensor; broken bead mixer; cables D6, D61, D617, D61714; PCB LLD sample reagent; PCB distribution sample reagent; PCB motherboard; PCB dilutor sample reagent	a. Check crash sensor switch ‘click’ by moving needle up and down b. Verify proper probe assembly c. Verify that arm moves gently (tubing blockage) d. Verify that reagent pack is loaded properly	No
5171	Premature detect.- micro particle	Bottom of bead bottle found too high	1: W 2: F	Reagent Pack cap closed; arm and / or rotor misalignment; arm loose; buckled bead mixer; steps lost during horizontal arm movement; steps lost during rotor movement	a. Verify that reagent pack is loaded properly b. Check crash sensor switch ‘click’ by moving needle up and down c. Open rack pack lids d. Check for proper pack placement e. Verify that pack is filled f. Verify that arm moves gently (tubing blockage)	No
5175	S/R arm - abnormal descent mixer	Bead mixer crash on Reagent Pack access	1: W/E 2: E/F	Reagent Pack cap closed; arm and / or rotor misalignment; arm loose; buckled bead mixer; steps lost during horizontal arm movement; steps lost during rotor movement;	a. Open rack pack lids b. Check for proper pack placement c. Verify that bead-bottle is filled d. Verify that mixer arm moves gently (tubing blockage)	No
5176	S/R arm - abnormal descent mixer	Bead mixer crash on cover	1: W/E 2: E/F	Arm misalignment; arm loose; buckled bead mixer; steps lost during horizontal arm movement;	a. Verify free movement of mixer arm b. Switch analyzer off/on	No

	CAN Bus:					
5180	S/R arm, probe, pipettor - commun.	Module does not answer to a transmission request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5181	S/R arm, probe, pipettor - commun.	Module does not answer to a frame request	F	See 5180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5182	S/R arm, probe, pipettor - commun.	Module does not request next frame	F	See 5180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5183	S/R arm, probe, pipettor - commun.	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
5184	S/R arm, probe, pipettor - commun.	Wrong sequence of frames within module message	F	Firmware error	a. Reinstall operating software	No
5185	S/R arm, probe, pipettor - commun.	CAN bus warning	F	See 5180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
5188	S/R arm, probe, pipettor - commun.	Unknown Command	E	SW error	a. Reinstall operating software	No
5189	S/R arm, probe, pipettor - commun.	Module does not signal end of command execution	F	See 5180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Others:					
5190	S/R module – pipettor failure	'Dilutor stop' signal from clot module missing	F	Cable D6; PCB motherboard; PCB dilutor sample reagent; PCB clot module B7	a. Call Technical Support	No

7.1.9 Incubator Module

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Memory / ADC:					
6023	Incubator module – memory	EEPROM checksum error	F	EEPROM; PCB incubator module B6	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
6025	Incubator module – memory	RAM read / write error	F	RAM; PCB incubator module B6; micro controller	a. Reinstall operating software	N/A
6026	Incubator module - ADC	ADC defective	F	ADC; PCB incubator module B6	a. Switch analyzer off/on b. If error recurs call Technical Support	No
6027	Incubator module – memory	ROM checksum error	F	Micro controller; PCB incubator module B6	a. Reinstall operating software	N/A
6028	Incubator module – memory	EEPROM communication error	F	EEPROM; PCB incubator module B6	a. Call Technical Support	N/A
	Internal Errors:					
6029	Incubator module - internal error	Measurement out of time	F	Firmware error	a. Switch analyzer off/on b. If error recurs call Technical Support	No
6030	Incubator module - internal error	Unknown command	F	Wrong firmware version; SW error	a. Reinstall operating software	No
6032	Incubator module - internal error	Parameter out of range	F	Wrong firmware version; SW error	a. Reinstall operating software	No
6040	Incubator module - internal error	Several concurrent commands	F	SW error	a. Reinstall operating software	No
	Heating:					
6050	Incubator module - heating	Over temperature detected	F	Heating Foil; heating resistor; fan incubation rotor; cable R26; PCB incubator module B6	a. Check fans and filters b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No
	Sensors:					
6061	Incubator module - sensor error	Measurement value of sensor 1 differs too much from mean value or is too low	0..1: W 2: F	Sensor; heating Foil; heating resistor; PCB incubator module B6	a. Switch analyzer off/on b. If error recurs call Technical Support	No
6062	Incubator module - sensor error	Measurement value of sensor 2 differs too much from mean value or is too low	0..1: W 2: F	See 6061	a. Switch analyzer off/on b. If error recurs call Technical Support	No

6063	Incubator module - sensor error	Measurement value of sensor 3 differs too much from mean value or is too low	0..1: W 2: F	See 6061	a. Switch analyzer off/on b. If error recurs call Technical Support	No
6064	Incubator module - sensor error	Measurement value of sensor 4 differs too much from mean value or is too low	0..1: W 2: F	See 6061	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Temperature:					
6101	Incubator module - temp. error	Temperature out of target range	W	Heating Foil; heating resistor; fan incubation rotor; cable R26; PCB incubator module B6	a. Check fans and filters b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	N/A
6102	Incubator module - temp. error	Temperature out of wide range for a longer period	F	See 6101	a. Check fans and filters b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No
6103	Incubator module - temp. error	Cumulative temperature deviation for a determination out of narrow range	W	See 6101	a. Check fans and filters b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	Yes
6104	Incubator module - temp. error	Cumulative temperature deviation for a determination out of wide range	E	See 6101	a. Check fans and filters b. Clean filter c. Verify that room temp. is within 18 - 32 °C d. Check distance of analyzer to wall e. Prevent direct sun light on analyzer	No

	CAN Bus:					
6180	Incubator module - commun.	Module does not answer to a transmission request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
6183	Incubator module - commun.	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
6185	Incubator module - commun.	CAN bus warning	F	See 6180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
6188	Incubator module - commun.	Unknown Command	E	SW error	a. Reinstall operating software	No
6189	Incubator module - commun.	Module does not signal end of command execution	F	See 6180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

7.1.10 Clot Detection Module

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Memory:					
7023	Clot detection module - memory	EEPROM checksum error	F	EEPROM; PCB clot detection B7	a. Switch analyzer off/on b. If error recurs call Technical Support	N/A
7025	Clot detection module - memory	RAM read / write error	F	RAM; PCB clot detection B7; micro controller	a. Reinstall operating software	N/A
7027	Clot detection module - memory	ROM checksum error	F	Micro controller; PCB clot detection B7	a. Reinstall operating software	N/A
7028	Clot detection module - memory	EEPROM communication error	F	EEPROM; PCB clot detection B7	a. Call Technical Support	N/A
	Internal Errors:					
7029	Clot detection - internal error	Measurement out of time	F	Firmware error	a. Switch analyzer off/on b. If error recurs call Technical Support	No
7030	Clot detection - internal error	Unknown command	F	Wrong firmware version; SW error	a. Reinstall operating software	No
7032	Clot detection - internal error	Parameter out of range	F	Wrong firmware version; SW error	a. Reinstall operating software	No
7040	Clot detection - internal error	Several concurrent commands	F	SW error	a. Reinstall operating software	No
	Sensors:					
7034	Clot detection - sensor failure	Sensor defective	F	Sensor; PCB clot detection B7	a. Switch analyzer off/on b. If error recurs call Technical Support	No
	Pressures:					
7050	Clot detection - pressure	Pressure too high	E	Clot; Fuse 15 V base print 1-7; sensor; PCB clot detection B7	a. Remove probe and clean it using an ultrasonic bath at 35 °C b. Exchange probe c. Exchange probe tubing	No
	Clot:					
7061	Clot or insufficient sample volume	Clot detected during aspiration	1: E 2: F	Clot in sample; sample tube / cup empty; cable C1; sensor; PCB clot detection B7	a. Repeat measurement with clot free sample	No
7062	Clot or insufficient sample volume	Clot detected after aspiration	1: E 2: F	Clot in sample; sample tube / cup empty; cable C1; sensor; PCB clot detection B7	a. Repeat measurement with clot free sample	No
7063	Clot or insufficient sample volume	Clot detected during and after aspiration	1: E 2: F	Clot in sample; sample tube / cup empty; cable C1; sensor; PCB clot detection B7	a. Repeat measurement with clot free sample	No

7069	Clot detection - internal error	Decay of system, no request of clot status possible	F	SW error	a. Reinstall operating software	No
	CAN Bus:					
7180	Clot detection module - commun.	Module does not answer to a transmission request	F	See 1180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
7183	Clot detection module - commun.	Receive buffer overflow	F	SW error	a. Reinstall operating software	No
7185	Clot detection module - commun.	CAN bus warning	F	See 7180	a. Switch analyzer off/on b. If error recurs call Technical Support	No
7188	Clot detection module - commun.	Unknown Command	E	SW error	a. Reinstall operating software	No
7189	Clot detection module - commun.	Module does not signal end of command execution	F	See 7180	a. Switch analyzer off/on b. If error recurs call Technical Support	No

7.1.11 Instrument

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Temporal Reproducibility:					
8001	Incubation period	Incubation period exceeded	W	Error recovery	a. If warning appears more often call Technical Support	Yes
8002	Incubation period	Incubation period widely exceeded	E	Error recovery	a. Repeat measurement	No
	Others:					
8010	Inventory shortage	Inventory calculation detected low volume of water or ProCell or CleanCell or waste to full during instrument action	E	More inventory need than expected during run preparation or STAT inclusion due to error recovery; Inventory shortage during actions other than run and cell check.	a. Check inventory and confirm replacement b. Repeat action rsp. repeat measurement of blocked or excluded orders	No
	Movement Interruption:					
8020	Power fail	Power fail	E	Power fail or power off during instrument action	a. Repeat measurement of blocked or excluded orders	No
8021	Instrument stopped	Instrument stopped	E	Instrument stopped by operator during instrument action	a. Check for missing results, repeat measurements if appropriate	No
8022	Cover opened	Cover opened	E	Cover opened by operator during instrument action	a. Close cover during Run	No
8023	Cell cleaning abort	Cell cleaning was aborted and the cell could not be primed with ProCell or water. SysClean (ISE) may be still in the cell.	F	Power fail or power off during cell cleaning; Fatal error with inhibits priming; Cover opened when arms are not initialized (could not moved to washing stations).	a. Perform immediately UTILITIES -> MAINTENANCE -> SERVICE -> PRIME & RINSE	N/A
	Others:					
8030	Same Sample ID in adjacent positions	Same Sample ID read by BCR in adjacent positions	F	Tubes with the same Sample ID in adjacent positions; Rotor misalignment; BCR misalignment	a. Check sample positions and bar codes b. If error recurs call Technical Support	N/A
	Operator Actions:					
8150	Calibration blocked	Calibration blocked by operator	I		Information only, no action required	N/A
8151	Calibration released	Calibration released by operator	I		Information only, no action required	N/A
8152	Previous calibration used	Previous calibration used by operator	I		Information only, no action required	N/A

8153	Actual calibration used	Actual calibration used again by operator (Undo usage of previous calibration)	I		Information only, no action required	N/A
8154	Calibration signal blocked	Calibration signal blocked by operator	I		Information only, no action required	N/A
8155	Calibration signal released	Calibration signal released again by operator (Undo of block)	I		Information only, no action required	N/A
8160	Time changed, old time	Time changed by User or Host/LSM. Time before change is displayed.	I		Information only, no action required	N/A
8161	Time changed, new time	Time changed by User or Host/LSM. Time after change is displayed	I		Information only, no action required	N/A
8170	Date changed, old date	Date changed by User or Host/LSM. Date before change is displayed.	I		Information only, no action required	N/A
8171	Date changed, new date	Date changed by User or Host/LSM. Date after change is displayed.	I		Information only, no action required	N/A

7.1.12 Additional Result Flags

#	Message	Description	Level	Possible Causes	Remedy	Result Value
	Sample / Control Result:					
9030	Calibration blocked	Calibration blocked	E	Calibration blocked by system or user	a. Validate calibration and release if appropriate b. Use previous calibration c. Repeat calibration with new calibrators	No
9031	Outside expected value range	Control result outside expected range	I	Control material; calibrators; reagents; cell (electrodes); reference electrode	a. Use new control material b. Check QC for long term stability c. In case of analyzer related problems call Technical Support	Yes[1]
9032	Outside expected value range	Sample result outside expected range	I	Result outside of diagnostic normal range	Information only	Yes[1]
9033	Outside measuring range	Result outside measurement range	I	Very low or very high species concentration	Use ‘automatic rerun with dilution’ or repeat measurement with manually prediluted sample	No[1+2]
9034	Rerun outside measuring range	Diluted sample (Auto-rerun) out of measurement range	I	Extremely high species concentration	Repeat measurement with appropriate manual sample predilution	No[1+3]
	Sample / Control Signal:					
9040	Outside measuring range	Concentration value not readable from calibration curve	I	Concentration value not readable from calibration curve	a. Dilute and repeat measurement	No[1+2]
9041	Outside measuring range	Negative raw signals occurred	I/E	Very low or very high species concentration	a. Dilute and repeat measurement	No[1+2]
	Result not done:					
9050	Run abort	Result not done because of run abort	E	Run abort because of fatal error	a. Repeat measurement	No
9051	STAT sample caused inv. short	Result not done because STAT samples caused inventory shortage	E	Not enough inventory to do the result because of the priority of STAT-samples	a. Repeat measurement	No
9053	Time needed for error recovery	Result not done because time is needed for error recovery actions	E	Error recovery actions	a. Repeat measurement	No

[1] Result is not blocked by system

[2] The lower or upper assay measurement limit with an '<' rsp. '>' sign in front of is shown to the operator instead of a result value

[3] The upper assay measurement limit with an '>' sign in front of is shown to the operator instead of a result value

	Calibrator Signals:					**Releasable**
9060	Duplicate limit exceeded	Duplicate limit exceeded	W	Cell carry over; cell electrodes	a. Perform CLEANING 2 (INTENSIV) b. Then repeat calibration using new CalSet kit and reagent kits	Yes
9061	Detection mod. - calib. signals	Difference cut off calibrator signals below limit	W	High calibrator; reagents; cell (electrodes); reference electrode	a. Repeat calibration using new CalSet kit and new reagent kit	Yes
9062	Detection mod. - calib. signals	Calibrator signal below limit	W	Calibrator on wrong position; calibrator; reagents; cell (electrodes); reference electrode	a. For actual results validate calibration, check calibrator position (see CALIB. LOADING LIST) b. Repeat calibration using new CalSet kit and new reagent kit	Yes
9063	Detection mod. - calib. signals	Calibrator signal above limit	W	Calibrator on wrong position; calibrator	a. For actual results validate calibration, check calibrator position (see CALIB. LOADING LIST) b. Repeat calibration with new CalSet kit	Yes
9064	Detection mod. - calib. signals	Calibrator signals not monotonous	E	Calibrator on wrong position; calibrator	a. For actual results validate calibration, check calibrator position (see CALIB. LOADING LIST) b. Repeat calibration with new CalSet kit	No
9065	Calibration curve slope invalid	Calibration curve slope invalid	E	Calibrator on wrong position; calibrator	a. For actual results validate calibration, check calibrator position (see CALIB. LOADING LIST) b. Repeat calibration with new CalSet kit	No
9066	Cal signal ratio out of range	Ratio of high calibrator to low calibrator is greater than 1.3	W	Wrong position of low and/or high calibrator; Low and high calibrator are changed by mistake; calibrator without bar code used	a. Place low and high calibrator to the right position on the S/R disk	Yes
	Others:					**Result Value**
9071	Result influenced by very high sample	Result influenced by very high sample (carry over)	I/W	Sample with very high concentration pipetted before a pipetting step for the actual determination	a. If calibration determination: For actual results validate calibration b. Repeat measurement	Yes
9072	Reagent expired	Date/time limit of reagent RackPack expired	I	Date/Time limit, read from the reagent RackPack bar code has been passed by actual time/date	a. Remove reagent RackPack from analyzer b. Then repeat with an unexpired reagent RackPack	Yes

7.2 Final Service Check

Depending on the repair action done on the instrument, it is advisable to check individual parts of the instrument.

Below please find a list of recommendations:

Repair action	**Checks to be done**	**Reference**
Repair and exchange of mechanical parts, e.g. on the MFA, incubator, wash stations, S/R rotor	Adjustment using the service software	6.2
Cell exchange and initial installation	1. Cell exchange, Cell install and cell check using the service software. 2. Volume check and sinal level calibration using the operating software	6.2 and 4.2.5.5
Any service action	1. Reset service counter on the maintenance log using the editor of the service software 2. Check pump volumes and adjust if necessary using the service software	6.2
Exchange of tubing between the sipper needle and the preheater of the cell	System volume check	Operating software
Exchange of PMT or BP1	Store new high voltage value using the service software and store values to adjustment disk	6.2
Exchange of any Controler PCB	Reload module software	6.2
Exchange of BCR	Adjust BCR using the service software	6.2
After major repair	Test run with TSH or FT4 (min three samples each)	Operating software
Exchange of any Base print PCB	Reload and store the adjustment values from the adjustment disk	6.2

8 Spare Parts

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8.1 Special Tools

Software:

- Service Software E1010
  Manual
  1 disk

- Software DOSTUS E1010
  Manual on disk
  1 disk

- Software Host Interface Test Program
  Manual
  1 disk

Easy Flange Kit™

To mount the flanges to PTFE and FEP tubings.

Tools

The tools listed below can be purchased locally:

- Screw driver for recessed-head screws, size 1
- Screwdriver flat, size 1
- Side cutter
- Fork wrench/ring wrench, size 13
- Allen key, size 2
- Allen key, size 2.5
- Allen key, size 3
- Allen key, size 4

8.2 Part Identification

The part identification list, is structured according to mecanical modules.

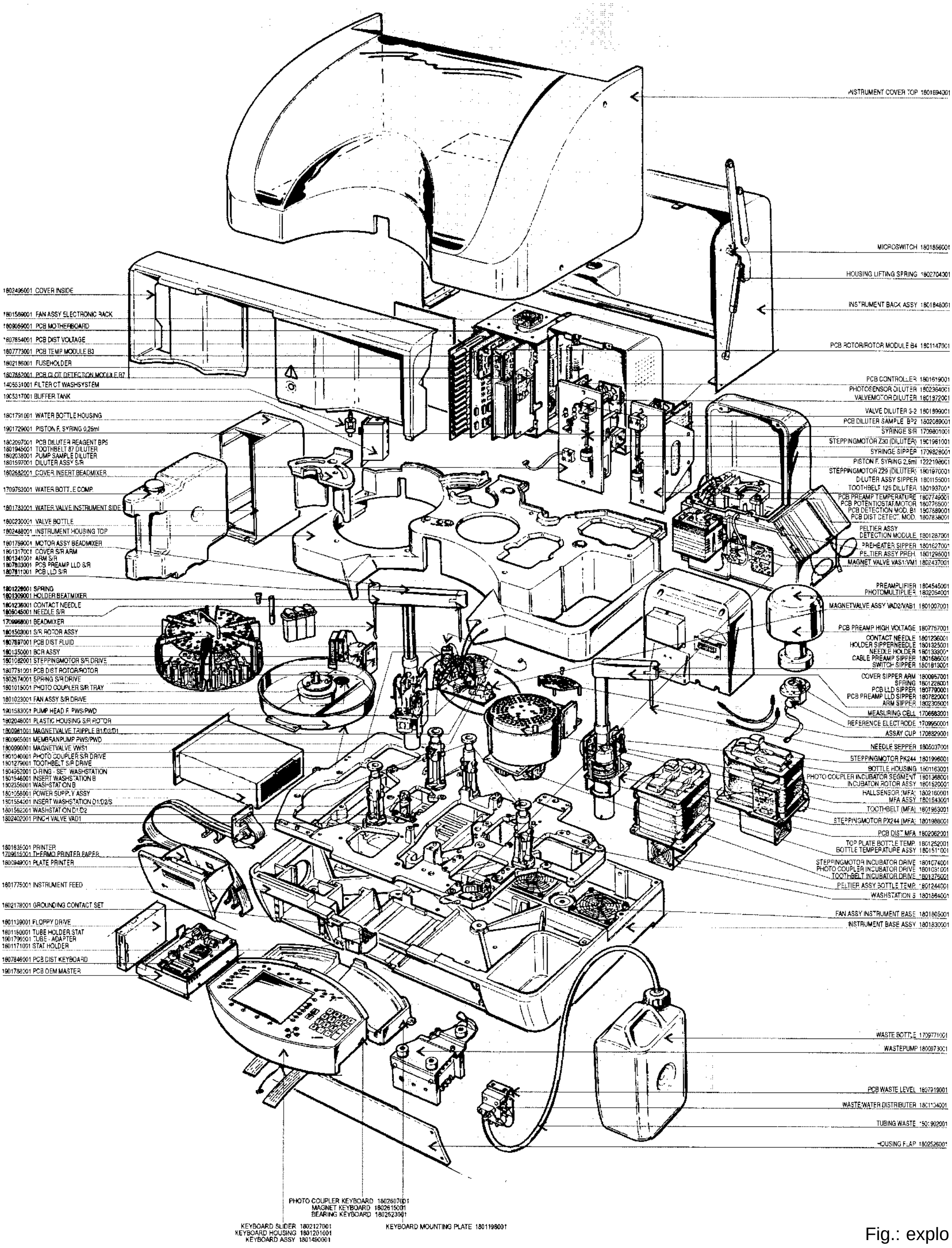
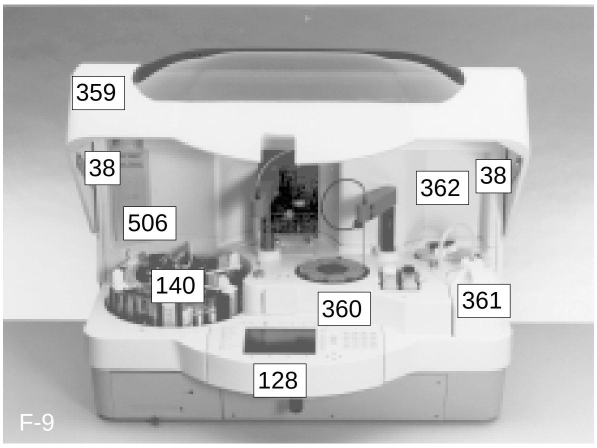

1802496001 COVER INSIDE
1801589001 FAN ASSY ELECTRONIC RACK
1809059001 PCB MOTHERBOARD
1807854001 PCB DIST VOLTAGE
1807773001 PCB TEMP MODULE B3
1802196001 FUSEHOLDER
1807852001 PCB CLOT DETECTION MODULE B7
1405531001 FILTER CT WASHSYSTEM
1905317001 BUFFER TANK
1801791001 WATER BOTTLE HOUSING
1901729001 PISTON F. SYRING 0,25ml
1802097001 PCB DILUTER REAGENT BP5
1801945001 TOOTHBELT 87 DILUTER
1802038001 PUMP SAMPLE DILUTER
1801597001 DILUTER ASSY S/R
1802682001 COVER INSERT BEADMIXER
1709763001 WATER BOTTLE COMP.
1801733001 WATES VALVE INSTRUMENT SIDE
1800230001 VALVE BOTTLE
1802488001 INSTRUMENT HOUSING TOP
1801759001 MOTOR ASSY BEADMIXER
1801317001 COVER S/R ARM
1801341001 ARM S/R
1807803001 PCB PREAMP LLD S/R
1807811001 PCB LLD S/R
1801228001 SPRING
1801309001 HOLDER BEATMIXER
1801236001 CONTACT NEEDLE
1805045001 NEEDLE S/R
1709968001 BEADMIXER
1801503001 S/R ROTOR ASSY
1807897001 PCB DIST FLUID
1801350001 BCR ASSY
1801082001 STEPPINGMOTOR S/R DRIVE
1807781001 PCB DIST ROTOR/ROTOR
1802674001 SPRING S/R DRIVE
1801015001 PHOTO COUPLER S/R TRAY
1801023001 FAN ASSY S/R DRIVE
1901583001 PUMP HEAD F. PWS/PWD
1802046001 PLASTIC HOUSING S/R ROTOR
1800981001 MAGNETVALVE TRIPPLE B1/D2/D1
1800965001 MEMBRANPUMP PWS/PWD
1800990001 MAGNETVALVE VWS1
1801040001 PHOTO COUPLER S/R DRIVE
1501279001 TOOTHBELT S/R DRIVE
1804952001 O-RING - SET WASHSTATION
1801546001 INSERT WASHSTATION B
1802356001 WASHSTATION B
1801058001 POWER SUPPLY ASSY
1801554001 INSERT WASHSTATION D1/D2/S
1801562001 WASHSTATION D1/D2
1802402001 PINCH VALVE VAD1
1801635001 PRINTER
1709615001 THERMO PRINTER PAPER
1800949001 PLATE PRINTER
1801775001 INSTRUMENT FEED
1802178001 GROUNDING CONTACT SET
1801139001 FLOPPY DRIVE
1801160001 TUBE HOLDER STAT
1901796001 TUBE - ADAPTER
1801171001 STAT HOLDER
1807846001 PCB DIST KEYBOARD
1901782001 PCB OEM MASTER
INSTRUMENT COVER TOP 1801694001
MICROSWITCH 1801856001
HOUSING LIFTING SPRING 1802704001
INSTRUMENT BACK ASSY 1801848001
PCB ROTOR/ROTOR MODULE B4 1801147001
PCB CONTROLLER 1801619001
PHOTOSENSOR DILUTER 1802364001
VALVEMOTOR DILUTER 1801972001
VALVE DILUTER 3-2 1801899001
PCB DILUTER SAMPLE BP2 1802089001
SYRINGE S/R 1709801001
STEPPINGMOTOR Z30 (DILUTER) 1901961001
SYRINGE SIPPER 1709828001
PISTON F. SYRING 2,5ml 1222198001
STEPPINGMOTOR Z29 (DILUTER) 1801970001
DILUTER ASSY SIPPER 1801155001
TOOTHBELT 125 DILUTER 1801937001
PCB PREAMP TEMPERATURE 1807749001
PCB POTENTIOSTAT/MOTOR 1807765001
PCB DETECTION MOD. B1 1507689001
PCB DIST DETECT. MOD. 1807838001
PELTIER ASSY DETECTION MODULE 1801287001
PREHEATER SIPPER 1801627001
PELTIER ASSY PREH. 1801295001
MAGNET VALVE VAS1/VM1 1802437001
PREAMPLIFIER 1804545001
PHOTOMULTIPLIER 1802054001
MAGNETVALVE ASSY VAD2/VAB1 1801007001
PCB PREAMP HIGH VOLTAGE 1807757001
CONTACT NEEDLE 1801236001
HOLDER SIPPERNEEDLE 1801325001
NEEDLE HOLDER 1801333001
CABLE PREAMP SIPPER 1801686001
SWITCH SIPPER 1801813001
COVER SIPPER ARM 1800957001
SPRING 1801228001
PCB LLD SIPPER 1807790001
PCB PREAMP LLD SIPPER 1807820001
ARM SIPPER 1802305001
MEASURING CELL 1706683001
REFERENCE ELECTRODE 1709950001
ASSAY CUP 1706829001
NEEDLE SEPPER 1805037001
STEPPINGMOTOR PK244 1801996001
BOTTLE HOUSING 1801163001
PHOTO COUPLER INCUBATOR SEGMENT 1801368001
INCUBATON ROTOR ASSY 1801520001
HALLSENSOR (MFA) 1802160001
MFA ASSY 1801543001
TOOTHBELT (MFA) 1801953001
STEPPINGMOTOR PX244 (MFA) 1801988001
PCB DIST MFA 1802062001
TOP PLATE BOTTLE TEMP. 1801252001
BOTTLE TEMPERATURE ASSY 1801511001
STEPPINGMOTOR INCUBATOR DRIVE 1801074001
PHOTO COUPLER INCUBATOR DRIVE 1801031001
TOOTHBELT INCUBATOR DRIVE 1801375001
PELTIER ASSY BOTTLE TEMP. 1801244001
WASHSTATION S 1801864001
FAN ASSY INSTRUMENT BASE 1801805001
INSTRUMENT BASE ASSY 1801830001
WASTE BOTTLE 1709771001
WASTEPUMP 1800973001
PCB WASTE LEVEL 1807919001
WASTE/WATER DISTRIBUTER 1801104001
TUBING WASTE 1501902001
HOUSING FLAP 1802526001
PHOTO COUPLER KEYBOARD 1802607001
MAGNET KEYBOARD 1802615001
BEARING KEYBOARD 1802623001
KEYBOARD SLIDER 1802127001
KEYBOARD HOUSING 1801201001
KEYBOARD ASSY 1801490001
KEYBOARD MOUNTING PLATE 1801198001

Fig.: explo

8.2.1 Covers

No.	ID Spare Part	Part Name English	Electronics
38		Screw	
128	1801490001	KEYBOARD ASSY	OEM Master
140	1801503001	S/R ROTOR ASSY	
181	1801341001	ARM S/R	
184	1709968001	BEAD MIXER	
185	1805045001	NEEDLE S/R	
188	1802305001	ARM SIPPER	
215	1801554001	INSERT WASH STATION D1/D2/S	
218	1801546001	INSERT WASH STATION B	
359	1801694001	INSTRUMENT COVER TOP	
360	1802488001	INSTRUMENT HOUSING TOP	
361	1709771001	BOTTLE WASTE	
362	1802496001	COVER INSIDE	
363		Side Wall	
364		Screw	
365		Tubing Connection	
366	1802712001	MFA HOUSING INSERT	
367		Screw	
368		Screw	
369		Front Panel	
370		Screw	
401		Cover Insert	
506	1709763001	WATER BOTTLE COMP.	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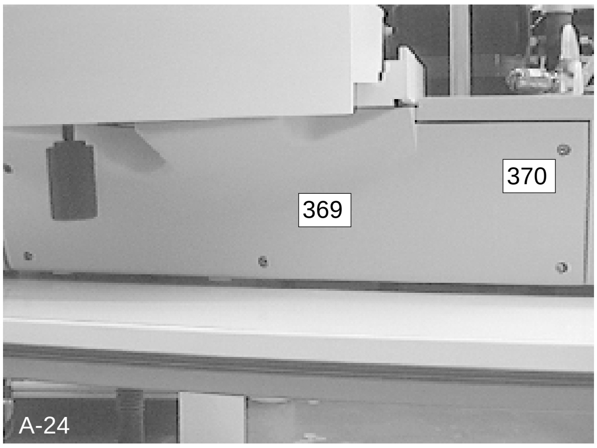
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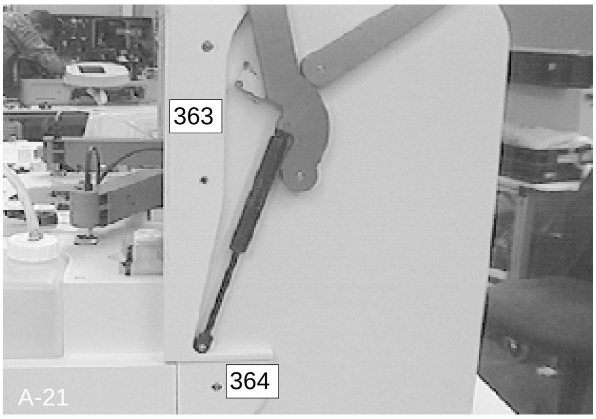
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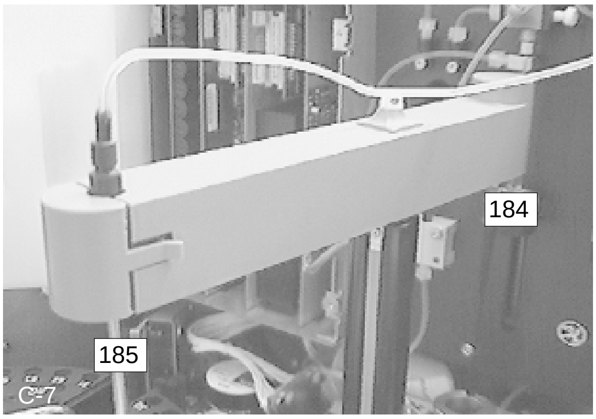
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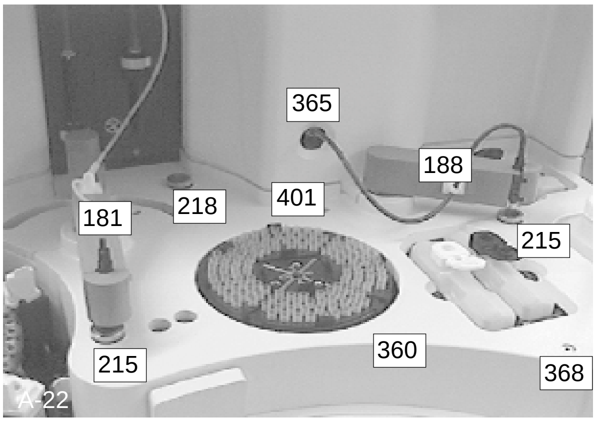
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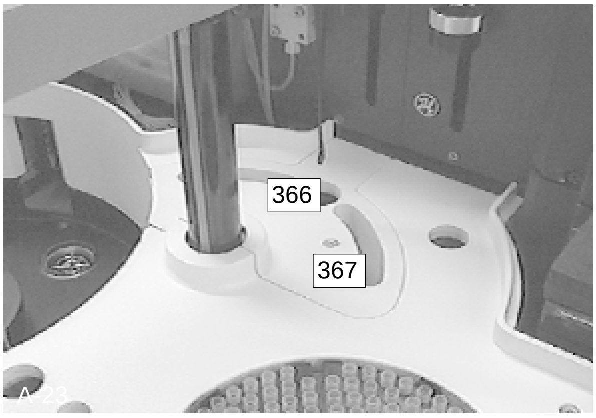
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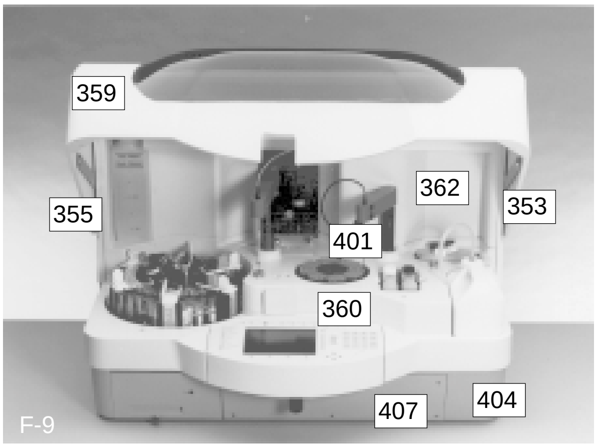
8.2.2 Housing

No.	ID Spare Part	Part Name English	Electronics
1	1801058001	POWER SUPPLY ASSY	Housing
2	1809059001	PCB MOTHER BOARD	Power Supply Assy
4	1807854001	PCB DIST VOLTAGE	Housing
46	1807773001	PCB TEMP MODULE B3	BP 3
73	1807862001	PCB CLOT DETECTION MODULE B7	BP 7
156		Air Intake Filter	
160		Electronic Rack	
171	1802178001	GROUNDING CONTACT SET	
204	1801830001	INSTRUMENT BASE ASSY	
205	1801848001	INSTRUMENT BACK ASSY	
206	1801775001	INSTRUMENT FEED	
208	1801805001	FAN ASSY INSTRUMENT BASE	OEM Master
210		Cable Connector	
352	1801589001	FAN ASSY ELECTRONIC RACK	OEM Master
353	1801856001	MICROSWITCH	BP 3
354	1802704001	HOUSING LIFTING SPRING	
355	1801856001	MICROSWITCH	BP 4
356		Cap	
359	1801694001	INSTRUMENT COVER TOP	
360	1802488001	INSTRUMENT HOUSING TOP	
362	1802496001	COVER INSIDE	
366	1802712001	MFA HOUSING INSERT	
371		Filter Cloth	
372		Cover	
373		Screw	
400	1801619001	PCB CONTROLLER	
401	1802682001	COVER INSERT BEADMiXER	
404		HOUSING BOTTOM	
407	1802526001	HOUSING FLAP	
422	1802186001	Fuse Holder SET3	
424	1802453001	CABLE PC9	
509		Fuse 1.6A, 10 pcs	
510		Fuse 1.15A, 10 pcs	
529	1802372001	CABLE NT 1	
Set 3	1802186001	FUSE HOLDER	
Set 7	1802194001	FUSE SET SET7	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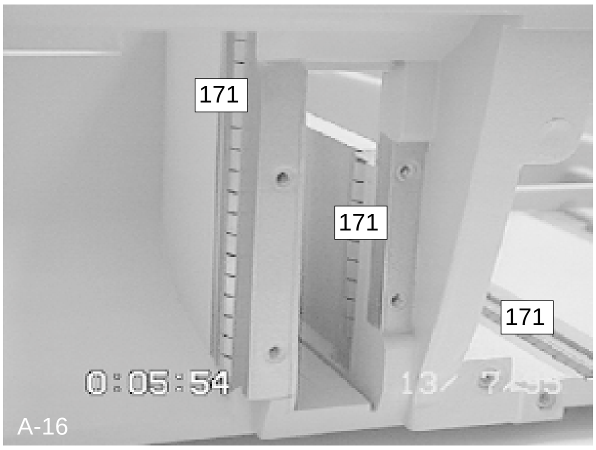
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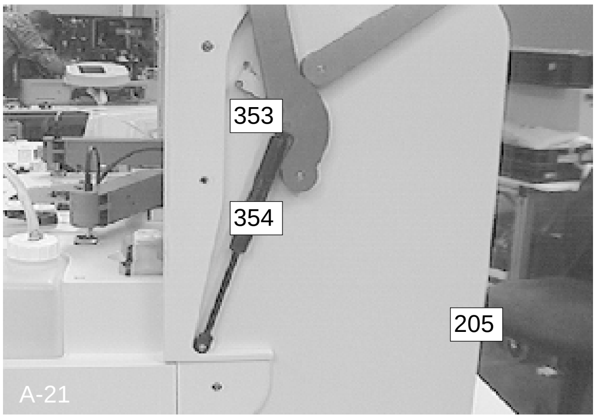
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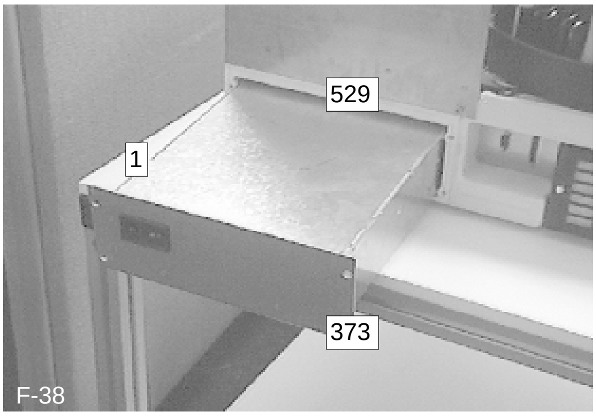
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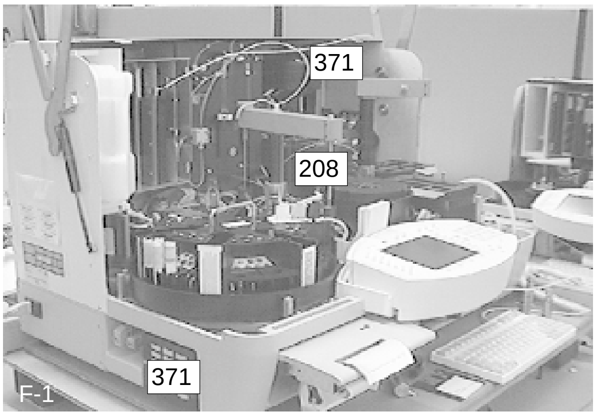
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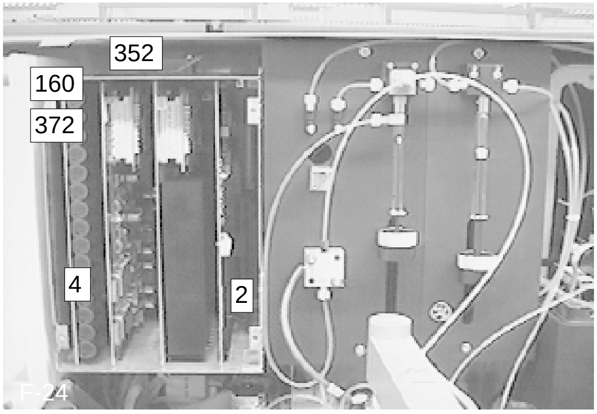
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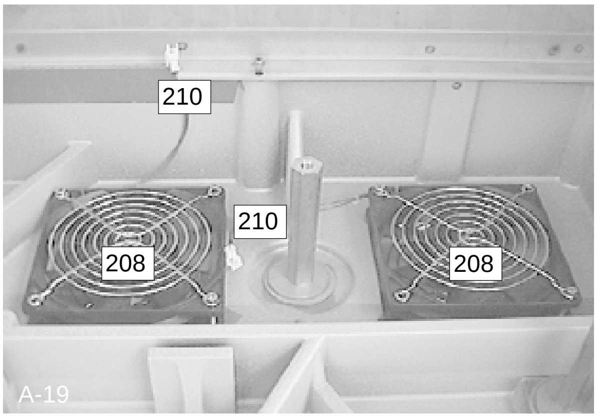
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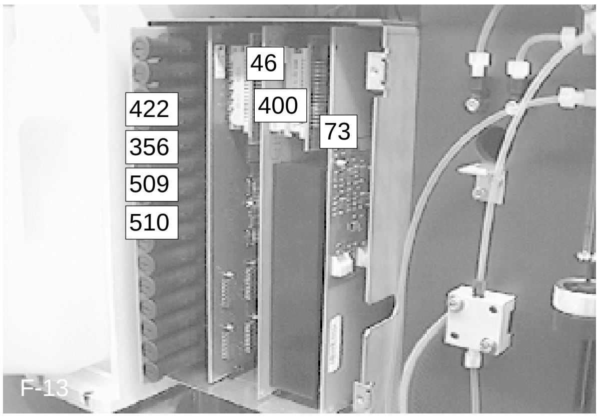
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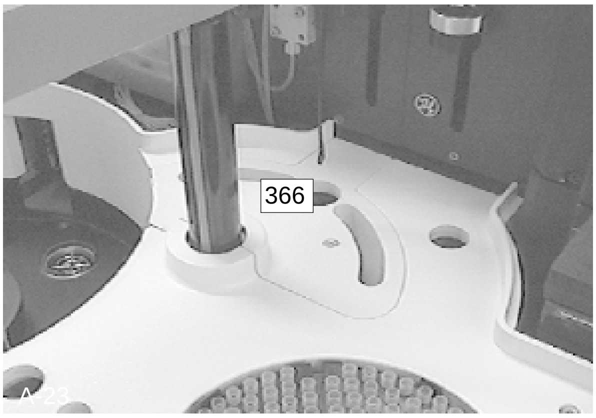
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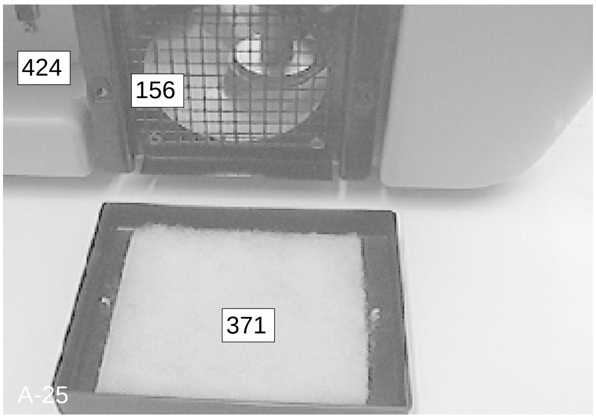
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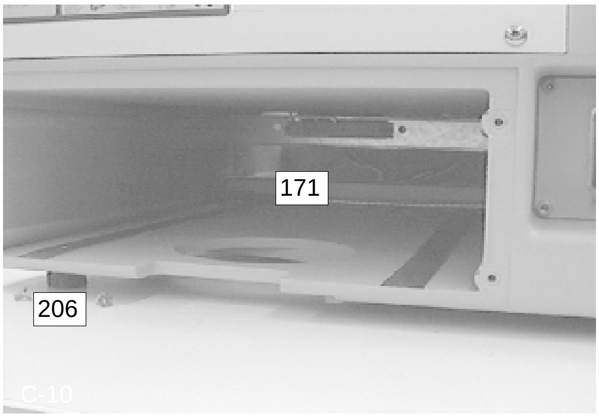
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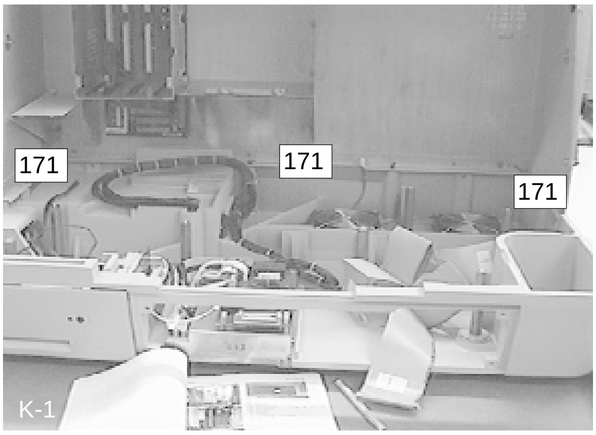
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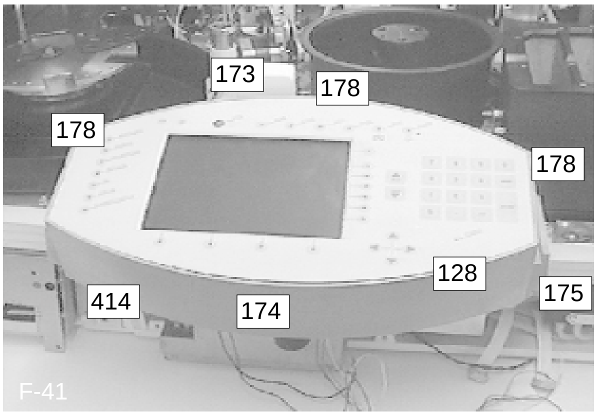
K-1

8.2.3 Keyboard Assy

No.	ID Spare Part	Part Name English	Electronics
71	1802607001	PHOTO COUPLER KEYBOARD	OEM Master
72	1802615001	MAGNET KEYBOARD	OEM Master
128	1801490001	KEYBOARD ASSY	OEM Master
173	1801171001	STAT HOLDER	
174	1801201001	KEYBOARD HOUSING	
175	1801198001	KEYBOARD MOUNTING PLATE	
176	1802623001	BEARING KEYBOARD	
177		Knurled Knob	
178		Screw	
179		Connecting Cable	
374		Water Tray	
390		Strain Relief	
414	1802127001	Keyboard Slider	
514	1802470001	CABLE FL1	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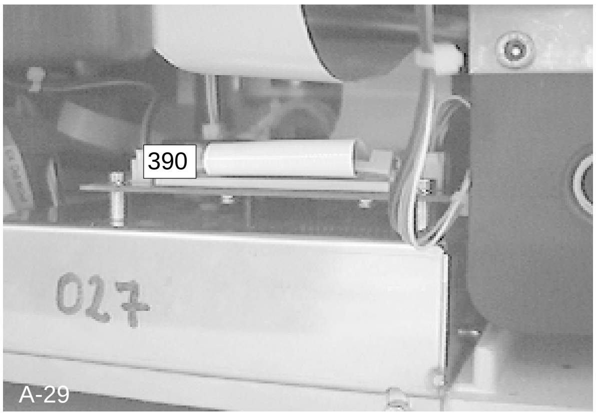
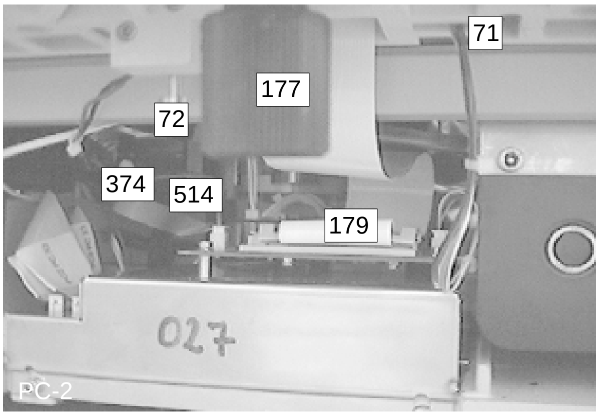
F-41

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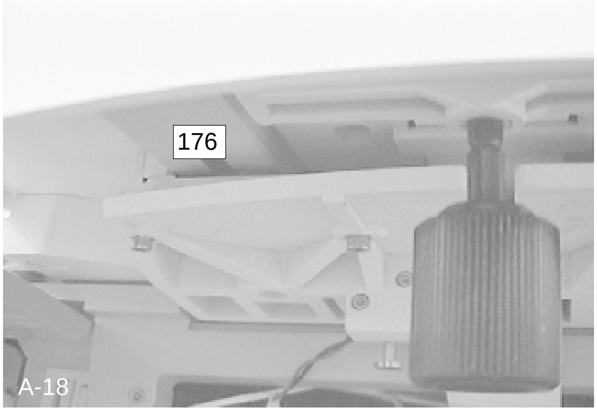
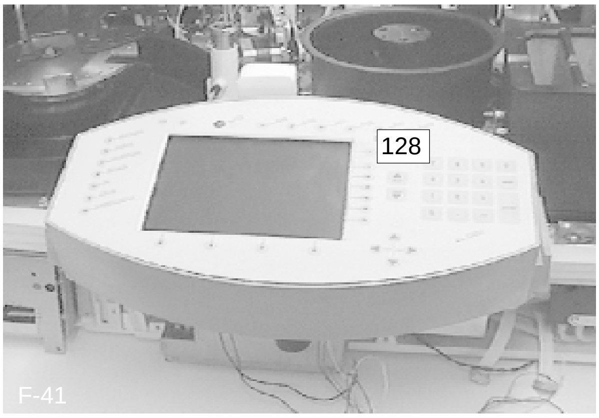
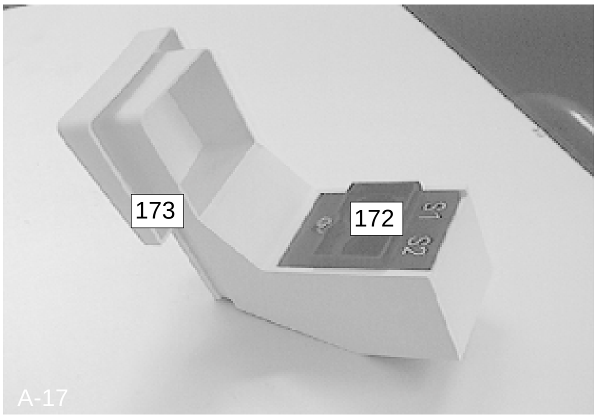
PC-2



8.2.4 STAT Holder

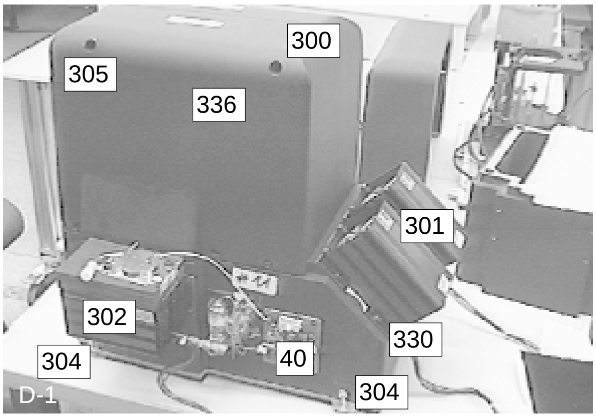
No.	ID Spare Part	Part Name English	Electronics
128	1801490001	KEYBOARD ASSY	OEM Master
172	1801180001	TUBE HOLDER STAT	
173	1801171001	STAT HOLDER	





8.2.5 Detection Module

No.	ID Spare Part	Part Name English	Electronics
9		Magnet Holder Assy	
37		XY Adjusting Tool for Magnet	
40	1807749001	PCB PREAMP TEMPERATURE	BP 3
42		Sensor	BP 1
45	1807749001	PCB PREAMP TEMPERATURE	BP 1
114	1802437001	MAGNET VALVE ASSY VAD2/VM1	BP 4
121	1802054001	Photomultiplier	BP 1
300	1802054001	Detection Module	
301	1801287001	PELTIER ASSY DETECTION MODULE	BP 3
302	1801295001	PELTIER ASSY PREHEATER	BP 3
304		Screw	
305		Screw	
306	1801627001	PREHEATER SIPPER	
307		Screw	
310		PCB PREAMP HIGH VOLTAGE	BP 1
311		Detection Preamplifier	BP 1
313		Compression Spring	
314	1802232001	Cable M1/M4	
315	1802232001	Cable M2	
317	1802232001	Cable M5	
318	1807765001	PCB POTENTIOSTAT / MOTOR	BP 1
320	1807889001	PCB DETECTION MODULE B1	BP 1
321		Seal Ring	
322	1807838001	PCB DIST DETECTION MODULE	BP 1
323	1706683001	CELL AND REF. ELECTRODE	BP 1
325	1801066001	MOTOR MAGNET DRIVE	BP 1
326	1802143001	HOLDER PHOTO COUPLER MD1	
327		Photo Coupler Holder	
329		Screw-cap	
330		Screw	
332		Lid	
333		Screw	
334		Screw	
335		Bush	
336		Hood	
337		Screw	
338	1802569001	CABLE M9	
339		Screw	
392		Bolt	
393		Sensor	BP 3
394		Screw	
395		Motor Mounting	
400	1801619001	PCB CONTROLLER	
409	1802151001	HOLDER MAGNET ASSY	
411	1802658001	TUBING CELL 0.8	
412	1802640001	TUBING SIPPER (2) 0.8	
416		Photo Coupler Assy, preadjusted	BP 1
417		Eccentric Ring, 2 pcs	
418		Photo Coupler Assy, preadjusted	BP 1
419		Photo Coupler Holder	
527	1802232001	Cable M10	
Set 1		CABLE SET DETECTION MODULE	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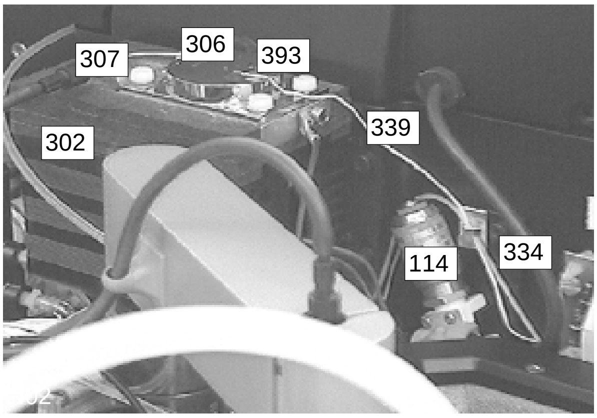
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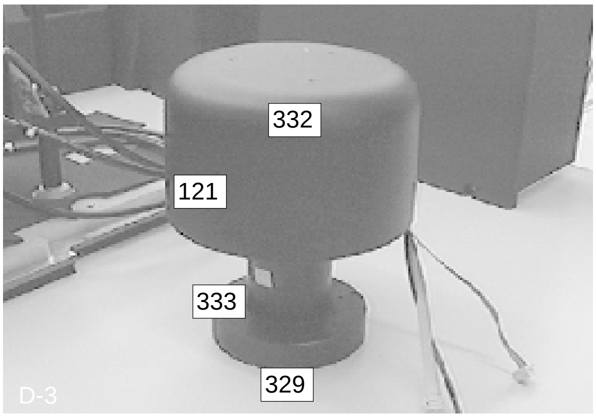
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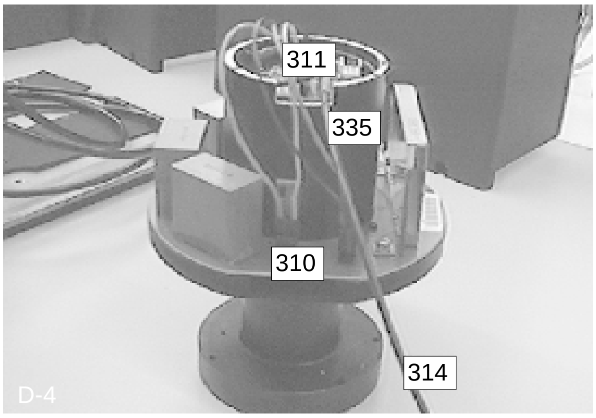
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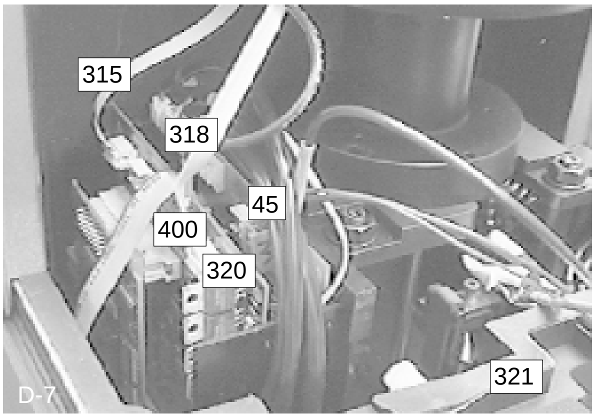
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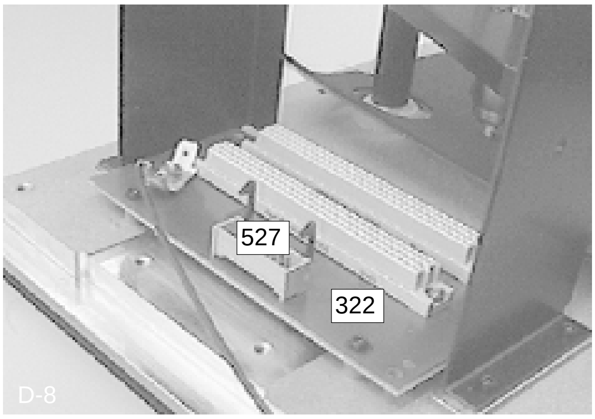
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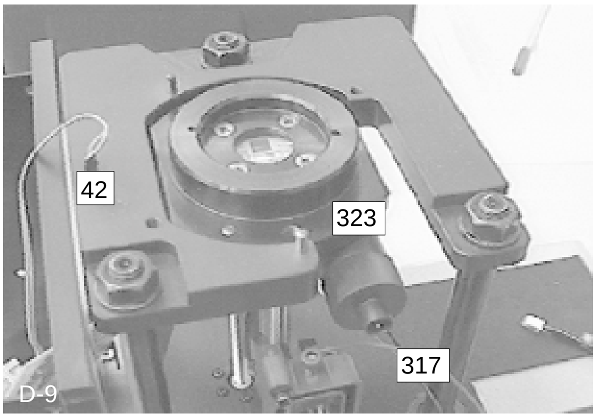
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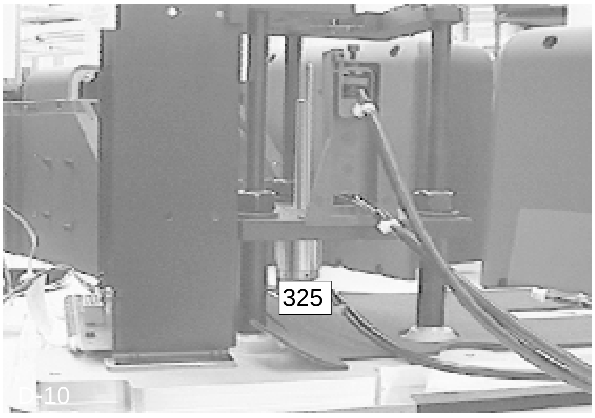
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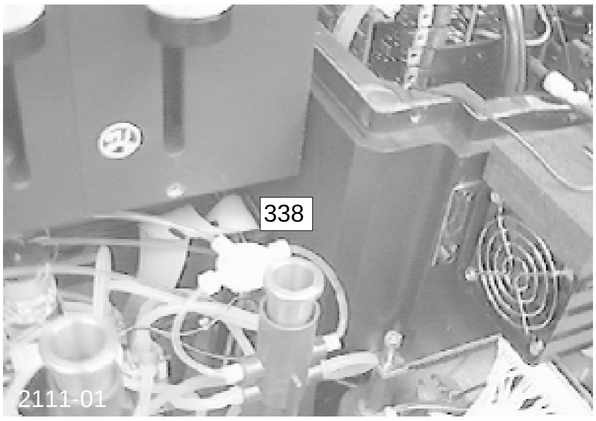
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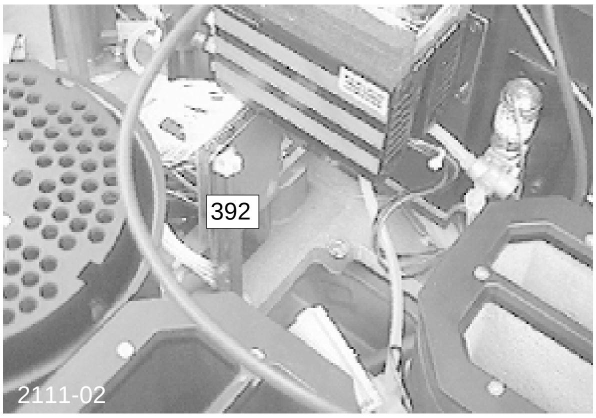
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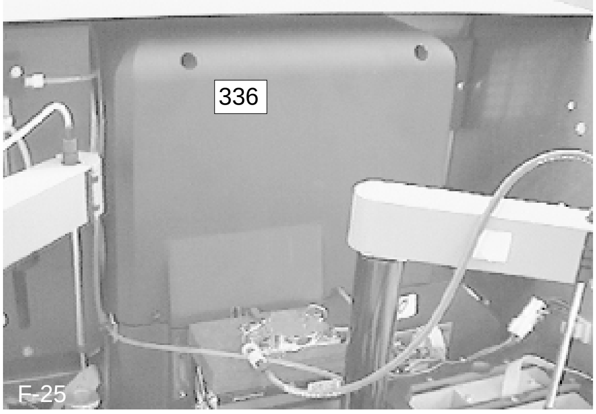
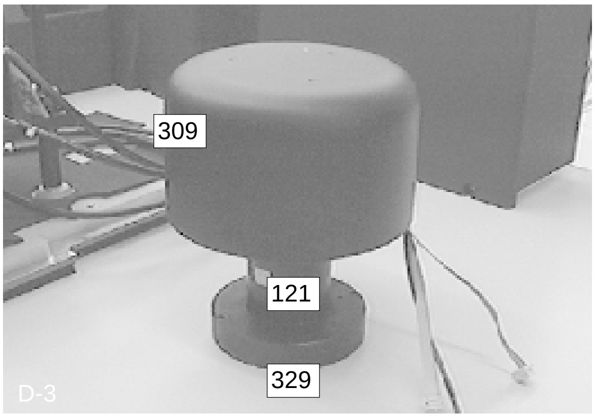
8.2.6 Cell and Reference Electrode

No.	ID Spare Part	Part Name English	Electronics
121	1802054001	PMT	BP 1
309	1802054001	Detection Cell	
323	1706683001	CELL AND REF. ELECTRODE	BP 1
329		Screw-cap	
324		Ref. Electrode	
336		Hood	

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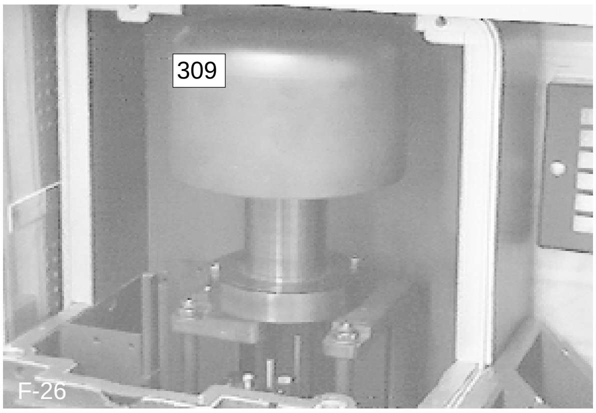
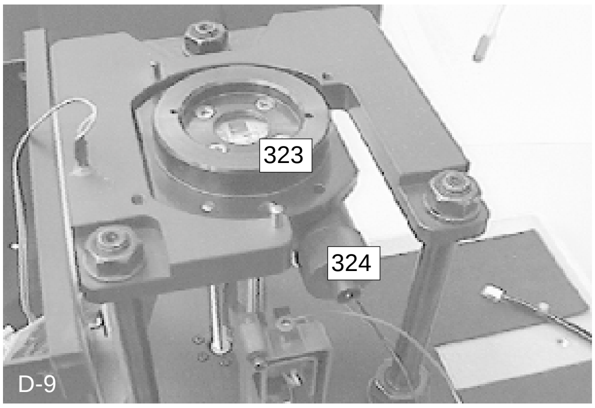
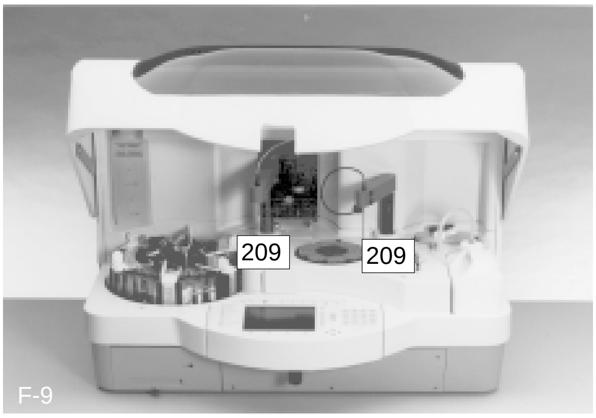




8.2.7 MFA Assy

No.	ID Spare Part	Part Name English	Electronics
209	1801643001	MFA ASSY	
212	1802283001	CABLE D61	
247	part of 385	Photo Coupler	BP 2
247	part of 385	Photo Coupler	BP 5
248	part of 385	Photo Coupler	BP 2
248	part of 385	Photo Coupler	BP 5
249	part of 385	Photo Coupler	BP 2
249	part of 385	Photo Coupler	BP 5
383	1801988001	STEPPING MOTOR PX 244 (MFA)	BP 2
383	1801988001	STEPPING MOTOR PX 244 (MFA)	BP 5
384	1801996001	STEPPING MOTOR PK 244 (MFA)	BP 2
384	1801996001	STEPPING MOTOR PK 244 (MFA)	BP 5
385	1802062001	PCB DIST MFA	BP 2
385	1802062001	PCB DIST MFA	BP 5
386	1801953001	TOOTH BELT (MFA)	
388	1802267001	CABLE (MFA)	
405	1802160001	HALL SENSOR (MFA)	BP 2
405	1802160001	HALL SENSOR (MFA)	BP 5
420		Screw	
524	1802313001	CABLE S51	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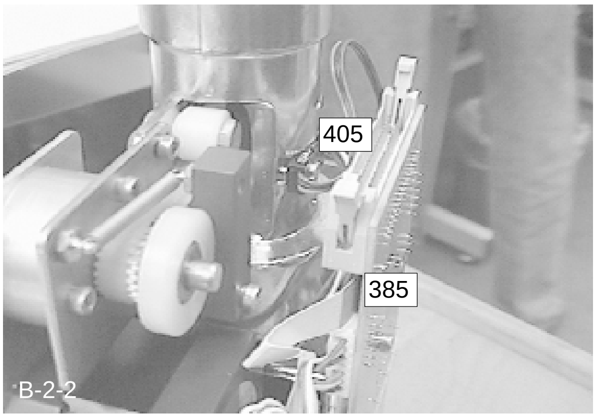
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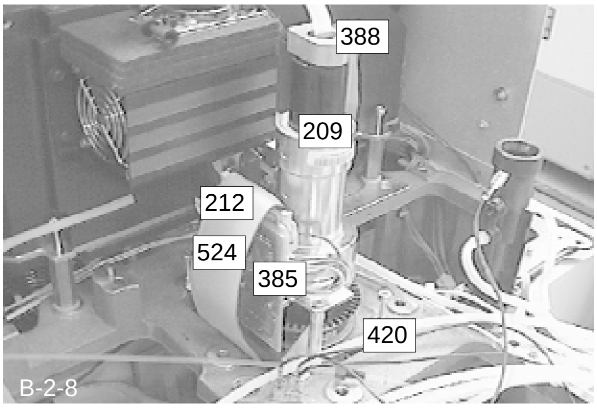
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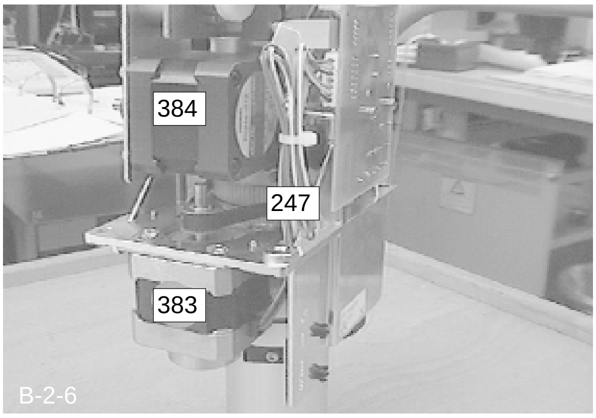
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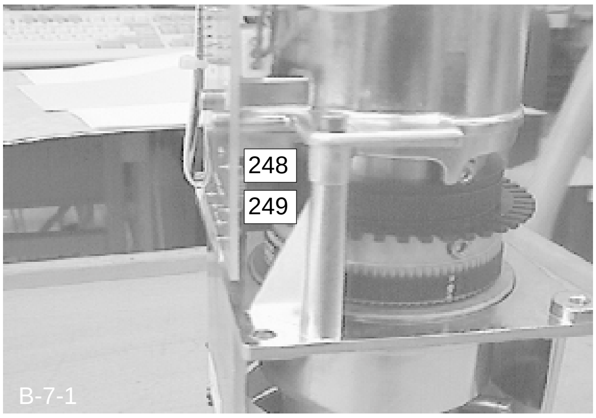
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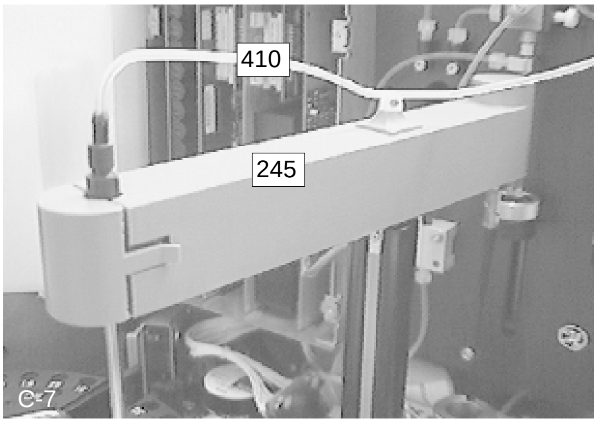
B-7-1

8.2.8 S/R Arm

No.	ID Spare Part	Part Name English	Electronics
78	1807811001	PCB LLD S/R	BP 5
79	1807803001	PCB PREAMP LLD S/R	BP 5
91	1801236001	CONTACT NEEDLE	BP 5
93	1801759001	MOTOR ASSY BEAD MIXER	BP 5
113	1801813001	SWITCH SIPPER	BP 5
181	1801341001	ARM S/R	
182	1801325001	HOLDER SIPPER NEEDLE	
183	1801309001	HOLDER BEAD MIXER	
184	1709968001	BEAD MIXER	
185	1805045001	NEEDLE S/R	BP 5
186	1801686001	CABLE PREAMP SIPPER	
192	1801228001	SPRING	
220	1801813001	SWITCH SIPPER	BP 5
234	1802518001	SPRING HOLDER	
244	1801333001	NEEDLE HOLDER	
245	1801317001	COVER S/R ARM	
246		Screw	
388		Cable (MFA)	
410	1802666001	TUBING S/R 1.5	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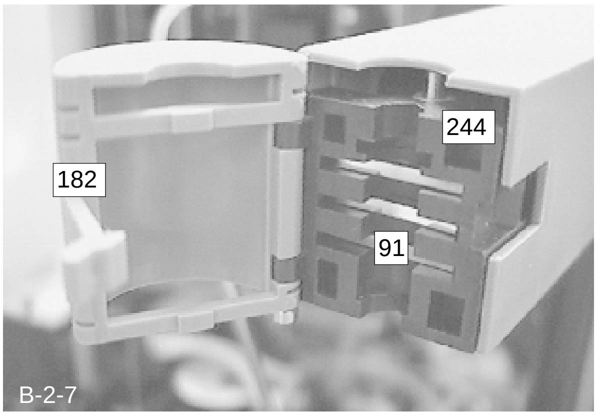
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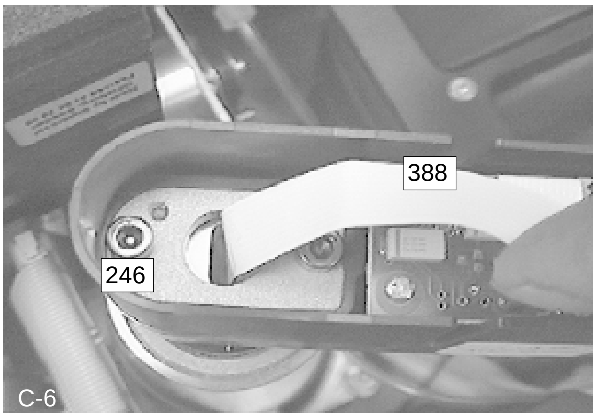
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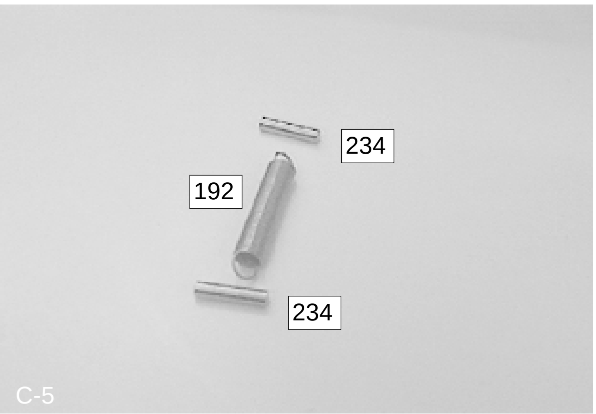
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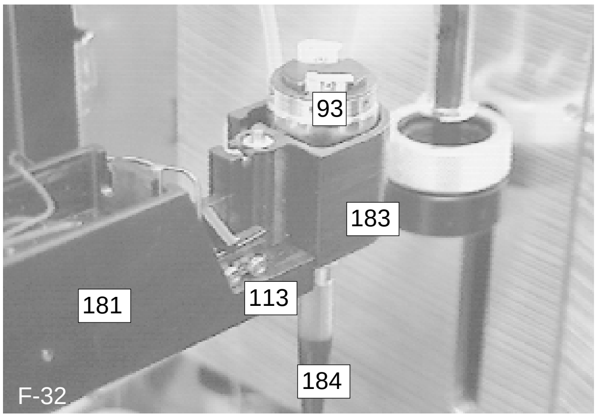
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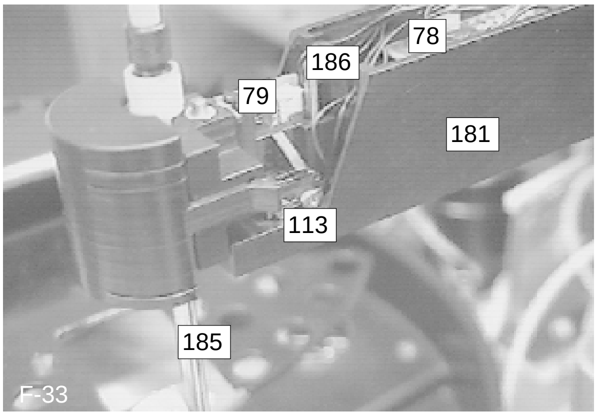
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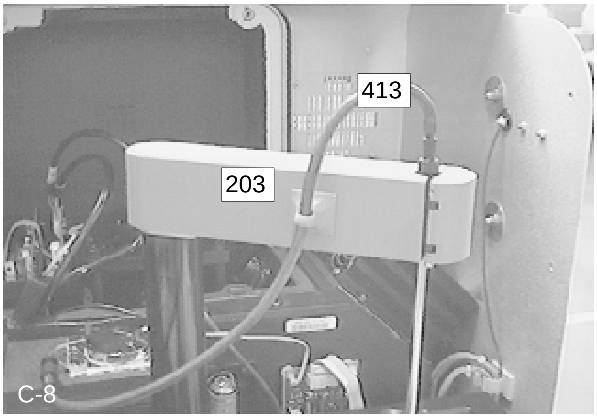
113
185
F-33

8.2.9 Sipper Arm

No.	ID Spare Part	Part Name English	Electronics
91	1801236001	CONTACT NEEDLE	BP 2
100	1807790001	PCB LLD SIPPER	BP 2
101	1807820001	PCB PREAMP LLD SIPPER	BP 2
113	1801813001	SWITCH SIPPER	BP 2
182	1801325001	HOLDER SIPPER NEEDLE	
186	1801686001	CABLE PREAMP SIPPER	
188	1802305001	ARM SIPPER	
189	1805037001	NEEDLE SIPPER	
192	1801228001	SPRING	
203	1800957001	COVER SIPPER ARM	
234	1802518001	SPRING HOLDER	
244	1801333001	NEEDLE HOLDER	
344		Screw	
388		Cable (MFA)	
413	1802631001	TUBING SIPPER (1) 0.8	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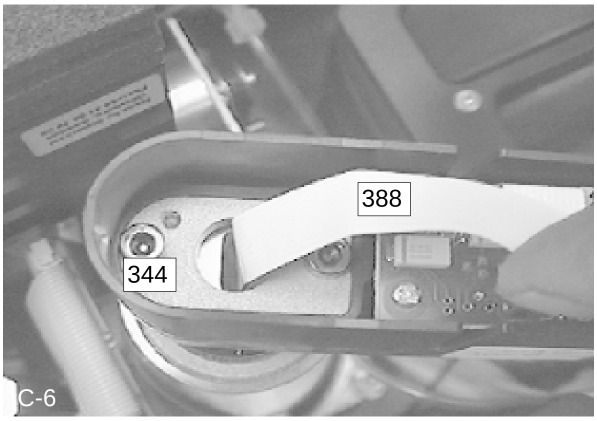
C-8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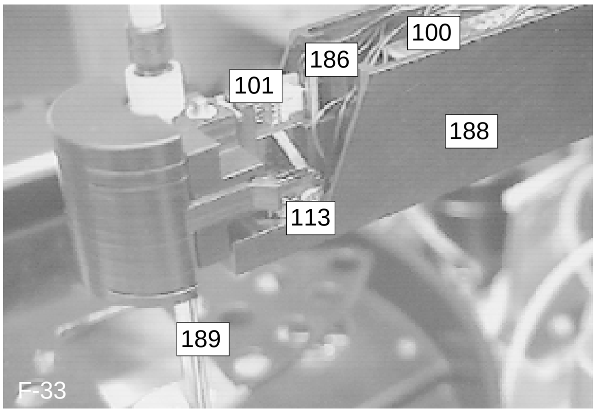
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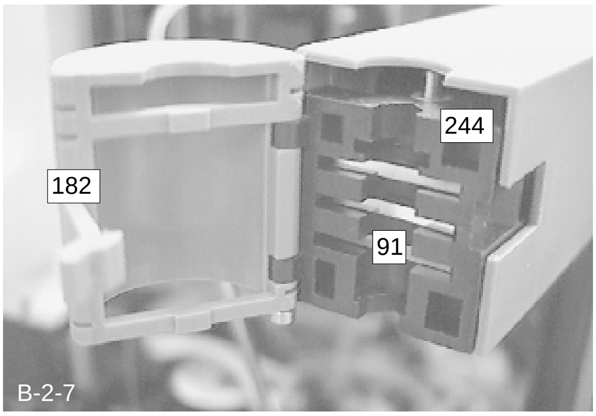
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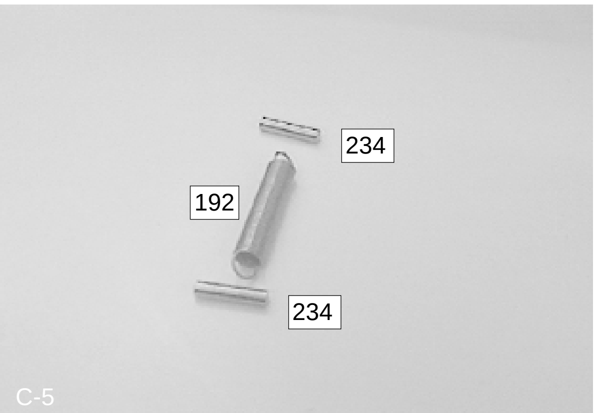
B-2-7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192
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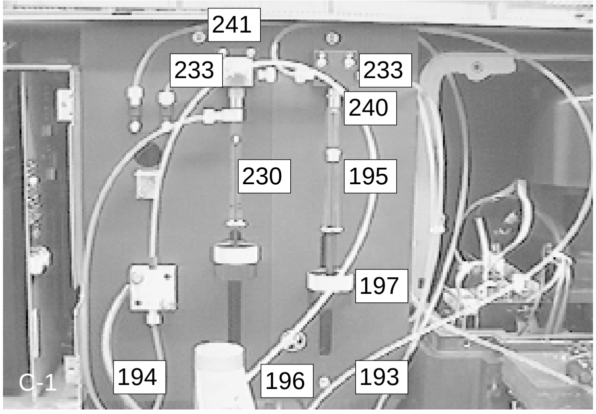
C-5

8.2.10 Dilutors

No.	ID Spare Part	Part Name English	Electronics
76	1802097001	PCB DILUTOR REAGENT BP5	BP 5
97	1802089001	PCB DILUTOR SAMPLE BP2	BP 2
193	1801597001	DILUTOR ASSY S/R	
194	1801155001	DILUTOR ASSY SIPPER	
195	1709828001	SYRINGE SIPPER	
196		Screw	
197		Nut	
211	1802364001	PHOTOSENSOR DILUTOR	BP 2
211	1802364001	PHOTOSENSOR DILUTOR	BP 5
230	1709801001	SYRINGE S/R	
231	1801872001	VALVE MOTOR DILUTOR	BP 2
231	1801872001	VALVE MOTOR DILUTOR	BP 5
233	1801899001	VALVE DILUTOR 3-2	
235	1802038001	PUMP SAMPLE DILUTOR	BP 5
236	1801970001	STEPPING MOTOR Z29 (DILUTOR)	
237	1801961001	STEPPING MOTOR Z30 (DILUTOR)	BP 5
240		Threaded Joint	
241		Screw	
400	1801619001	PCB CONTROLLER	
423	1802364001	PHOTOSENSOR DILUTOR	BP 2
423	1802364001	PHOTOSENSOR DILUTOR	BP 5
425	1801937001	TOOTH BELT 87 DILUTOR	
426	1801945001	TOOTH BELT 87 DILUTOR	
513	1802291001	CABLE D6	
523	1802321001	CABLE S5	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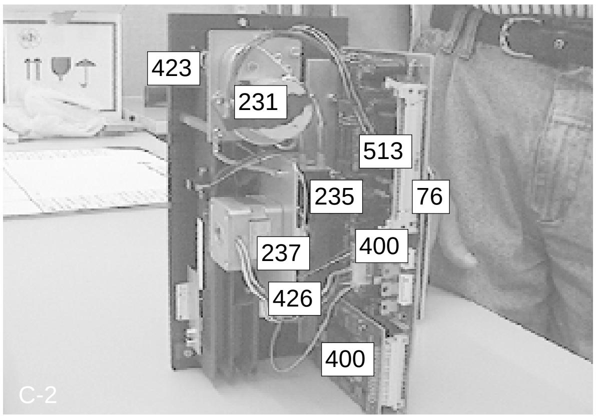
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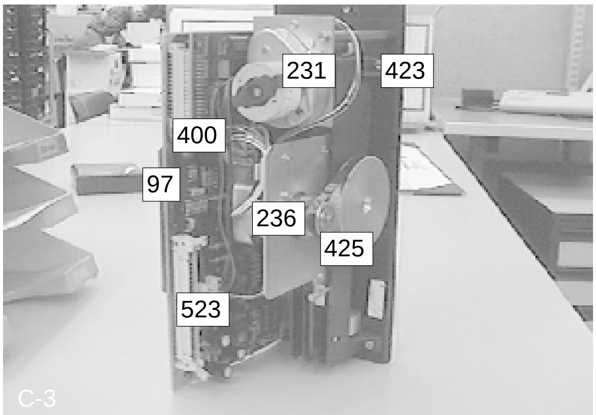
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425
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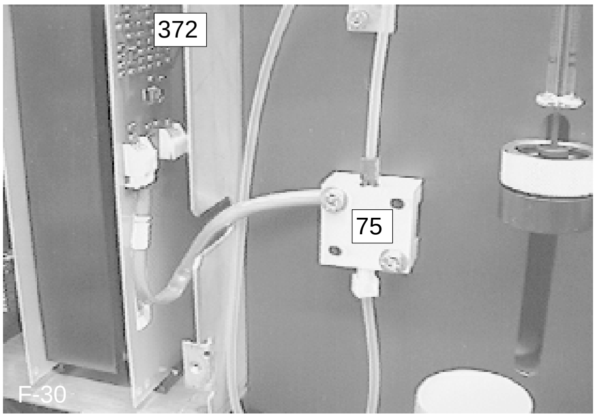
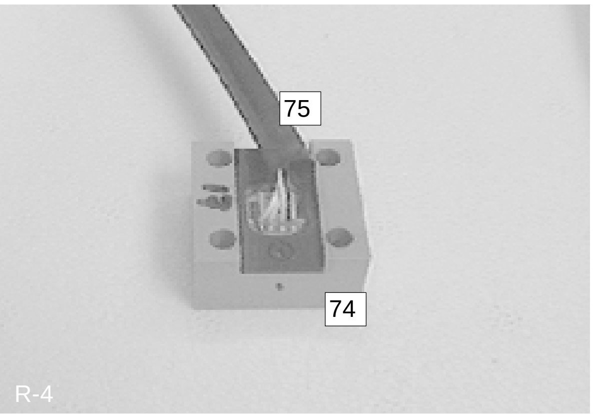
C-3

8.2.11 Housing Pressure Sensor

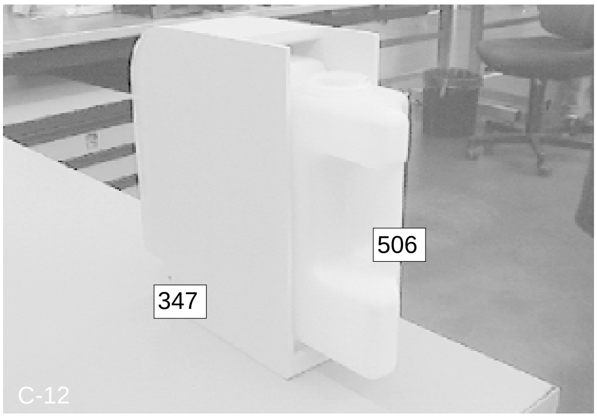
No.	ID Spare Part	Part Name English	Electronics
74		HOUSING PRESSURE SENSOR	
75	1801821001	PRESSURE SENSOR ASSY	BP 7
372		Cover	

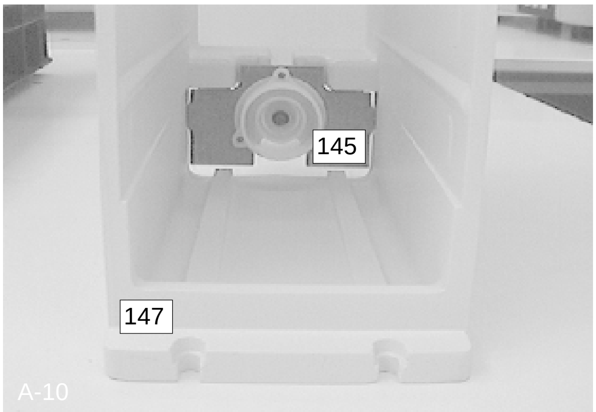


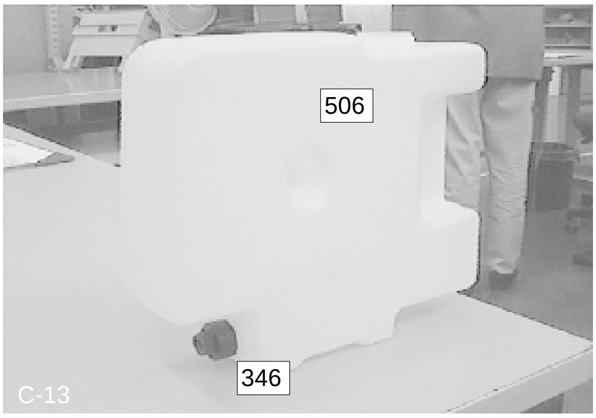


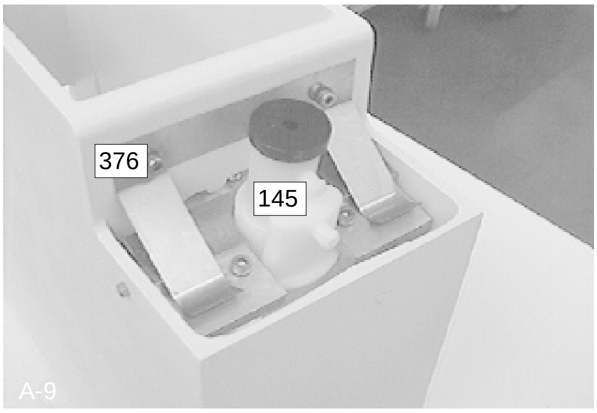
8.2.12 Water Supply Module

No.	ID Spare Part	Part Name English	Electronics
145	1801783001	WATER VALVE INSTRUMENT SIDE	
147		Screw	
346	1800230001	WATER VALVE BOTTLE SIDE	
347	1801791001	WATER BOTTLE HOUSING	
376		Screw	
506	1709763001	Distilled Water Bottle	



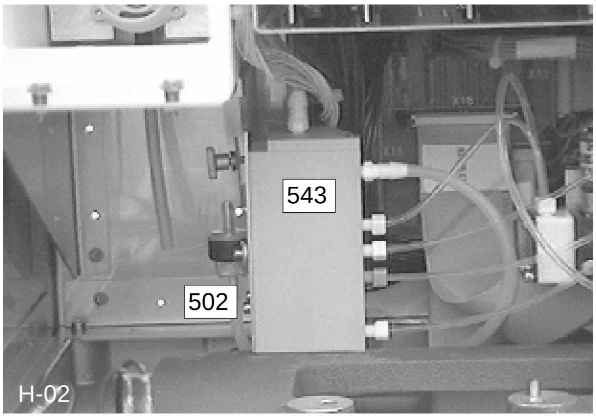


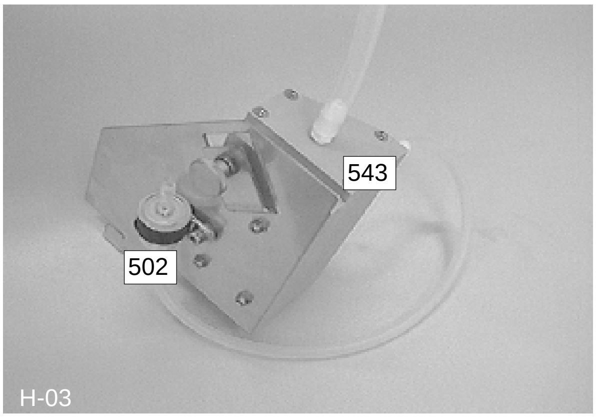




8.2.13 Buffer Tank

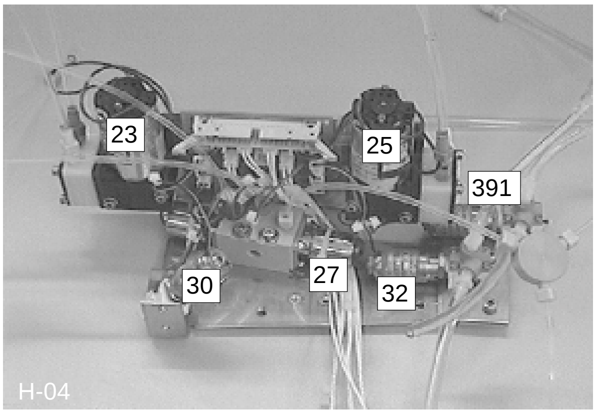
No.	ID Spare Part	Part Name English	Electronics
502	1406531001	Filter CT Wash system SET2	
543	1905317001	Buffer Tank	





8.2.14 Pumps and Valves

No.	ID Spare Part	Part Name English	Electronics
23	1800965001	MEMBRANE PUMP PWS/PWD	BP 4
24	1800973001	WASTE PUMP	BP 4
25	1800965001	MEMBRANE PUMP PWS/PWD	BP 4
26	1802437001	MAGNET VALVE VAS1	BP 4
27	1800981001	MAGNET VALVE 3-WAY B1/D2/D1	BP 4
30	1800990001	MAGNET VALVE VWS1	BP 4
32	1801007001	MAGNET VALVE ASSY VAD2/VM1	BP 4
114	1802437001	MAGNET VALVE ASSY VAD2/VM1	BP 4
115	1802402001	PINCH VALVE VAD1	BP 4
233	1801899001	VALVE DILUTOR 3-2	
235	1802038001	PUMP SAMPLE DILUTOR	BP 5
391	1801007001	MAGNET VALVE ASSY VAD2/VM1	BP 4
544	1904680001	Pinch Tubing (is also included in Set 2)	
	1901583001	Pump head for PWS/PWD	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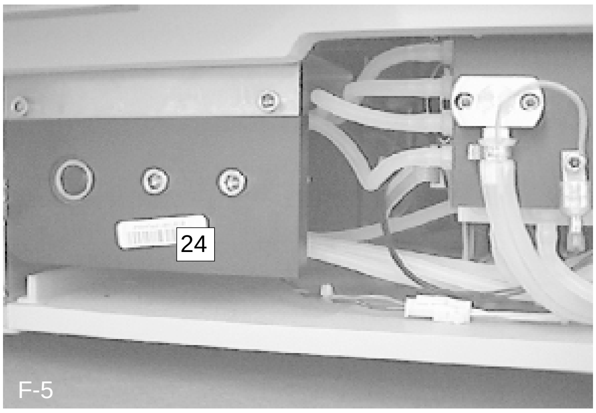
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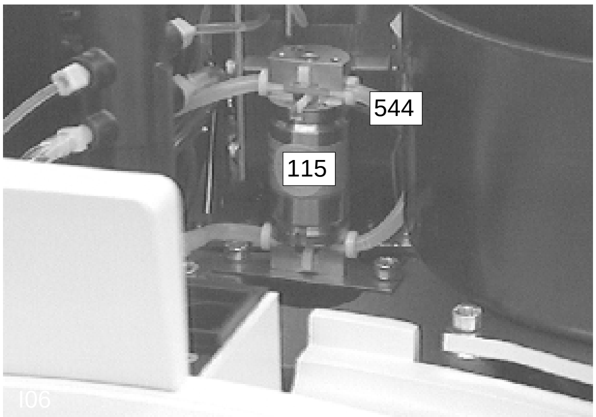
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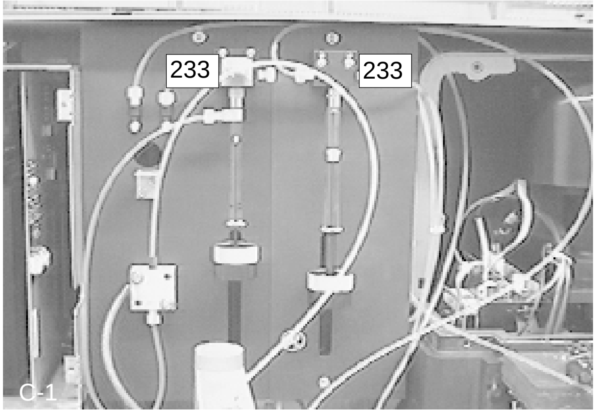
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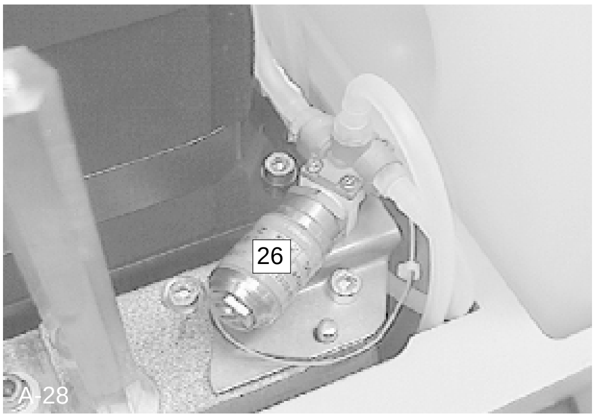
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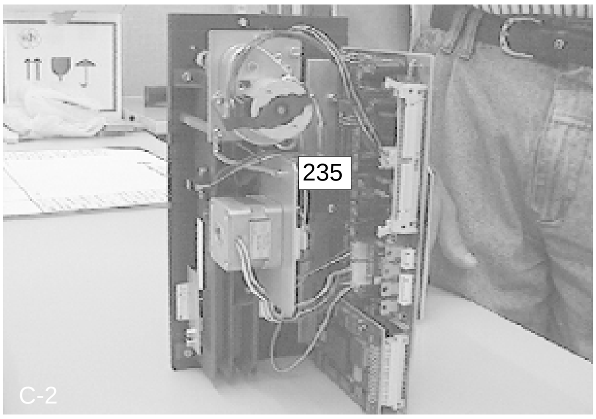
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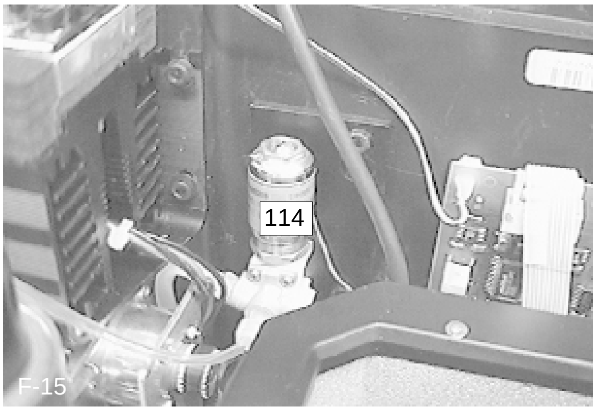
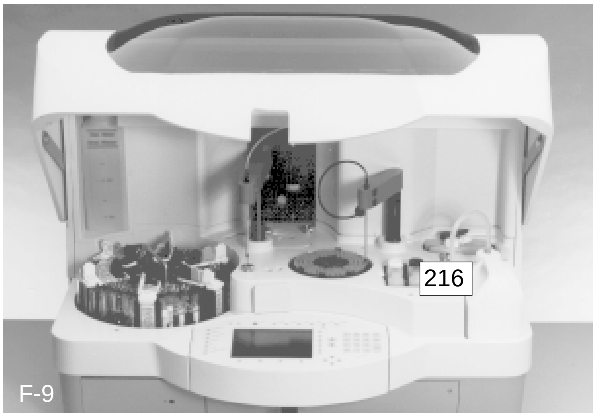
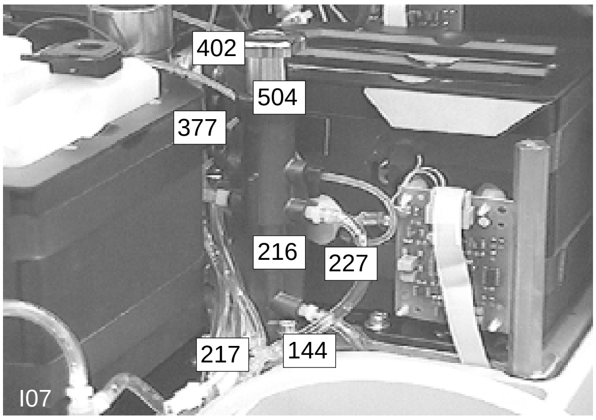

114
F-15

8.2.15 Wash Station S

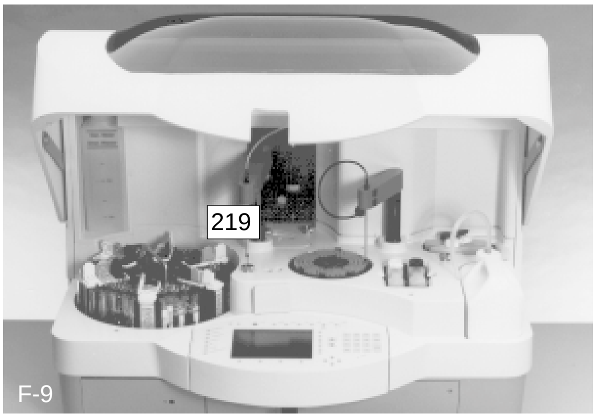
No.	ID Spare Part	Part Name English	Electronics
144		Screw	
216	1801864001	WASH STATION S	
217	1906933001	Y-Piece, 3 pcs	
227	1906933001	Y-Piece, 3 pcs	
377		Ground Cable	
402	1801554001	INSERT WASH STATION D1/D2/S	
504	1804952001	O-Ring Wash Station D1, D2, S	

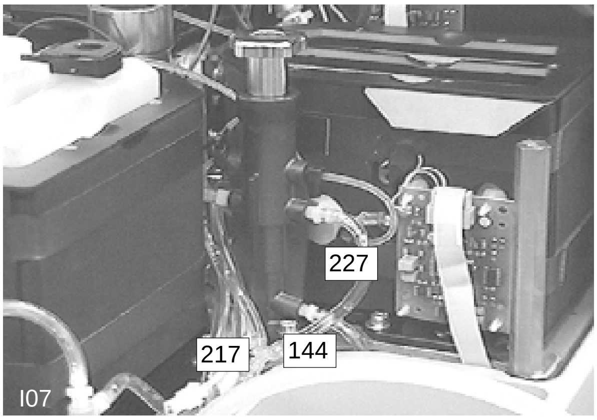




8.2.16 Wash Station Bead Mixer

No.	ID Spare Part	Part Name English	Electronics
144		Screw	
217	1906933001	Y-Piece, 3 pcs	
218	1801546001	INSERT WASH STATION B	
219	1802356001	WASH STATION B	
227		Y-Piece, 3 pcs	
505	1804952001	O-Ring Wash Station Bead Mixer	

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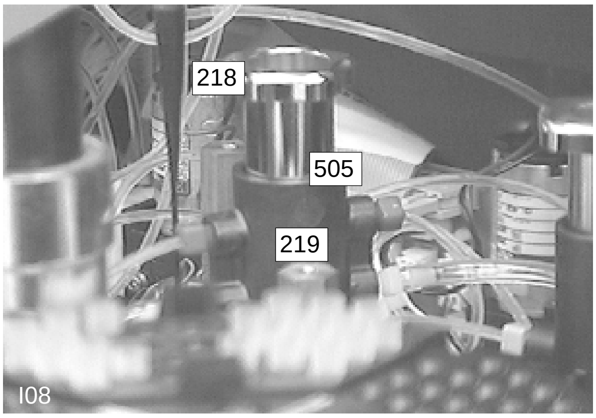
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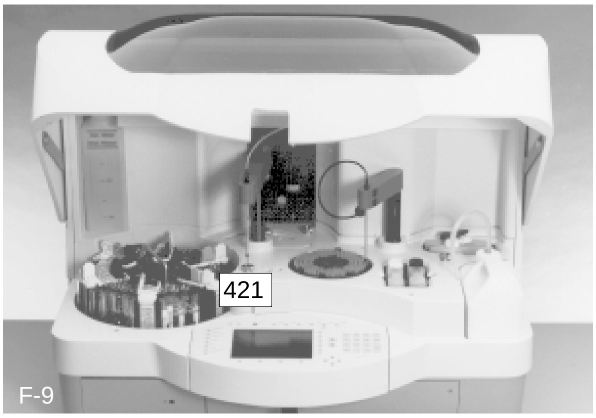
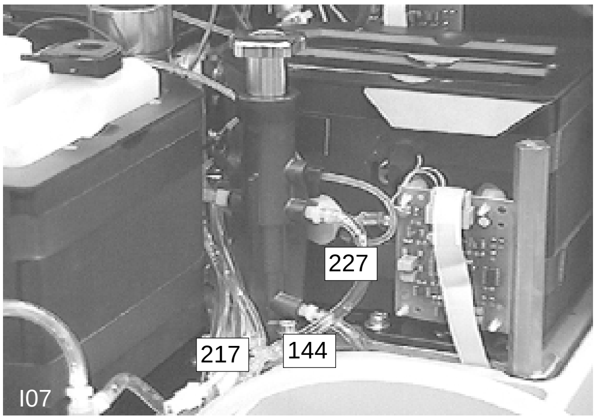
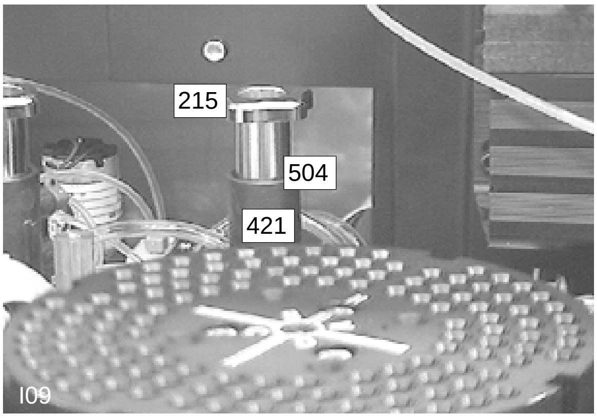
8.2.17 Wash Station D2

No.	ID Spare Part	Part Name English	Electronics
144		Screw	
215	1801554001	INSERT WASH STATION D1/D2/S	
217	1906933001	Y-Piece, 3 pcs	
227	1906933001	Y-Piece, 3 pcs	
421	1801562001	WASH STATION D1/D2	
504	1804952001	O-Ring Wash Station D1, D2, S	

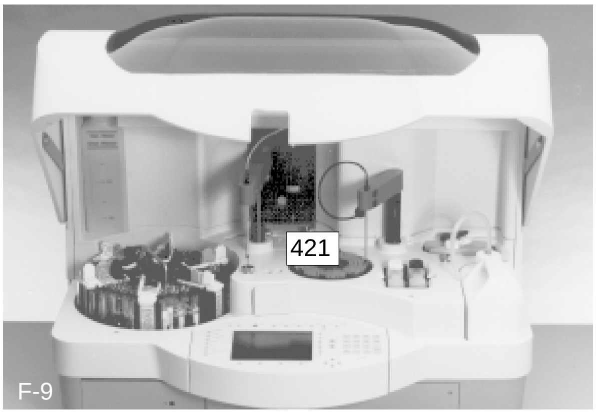


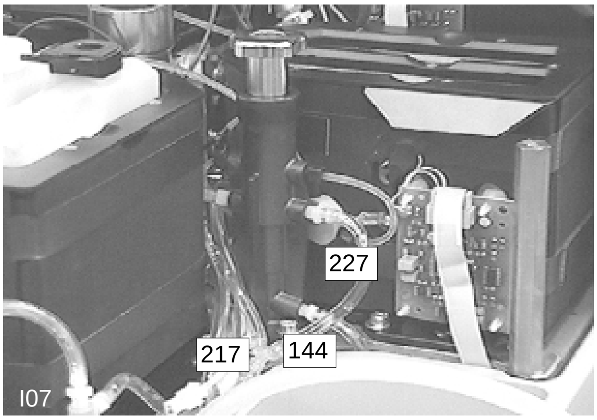




8.2.18 Wash Station D1

No.	ID Spare Part	Part Name English	Electronics
144		Screw	
215	1801554001	INSERT WASH STATION D1/D2/S	
217	1906933001	Y-Piece, 3 pcs	
227	1906933001	Y-Piece, 3 pcs	
421	1801562001	WASH STATION D1/D2	
504	1804952001	O-Ring Wash Station D1, D2, S	
544	1904680001	Pinch Tubing (is also included in Set 2)	

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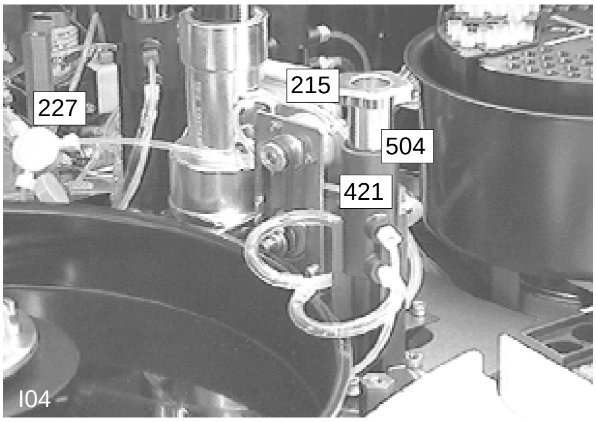
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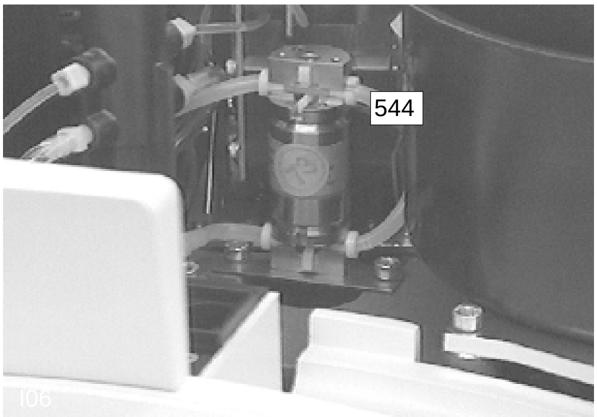
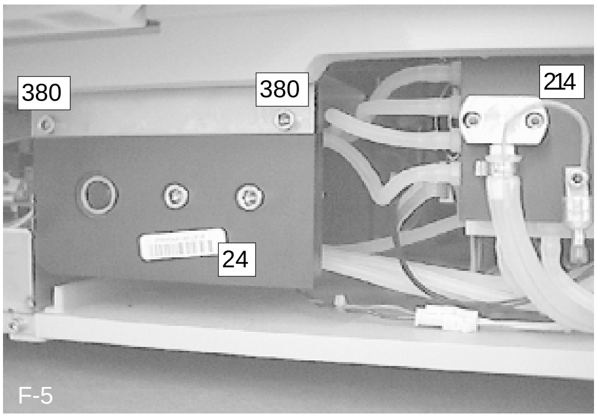


8.2.19 Waste Module

No.	ID Spare Part	Part Name English	Electronics
24	1800973001	WASTE PUMP	BP 4
214	1801104001	WASTE/WATER DISTRIBUTOR	
223	1807919001	PCB WASTE LEVEL	BP 3
351	1801902001	TUBING WASTE	
361	1709771001	BOTTLE WASTE	
380		Screw	
501		O-Ring Waste	
502	1406531001	Filter CT Wash system SET2	
503	1804162001	Tubing for Waste Pump, 4 pcs	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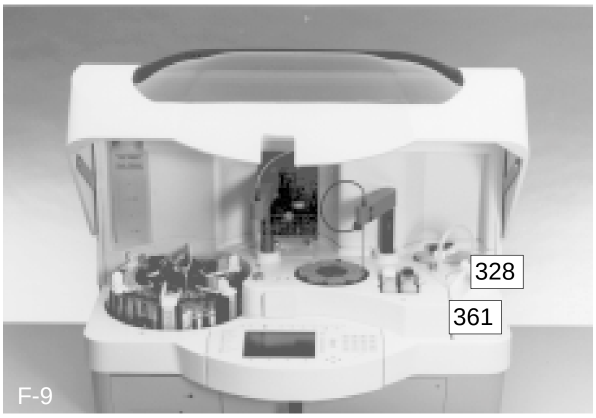
F-5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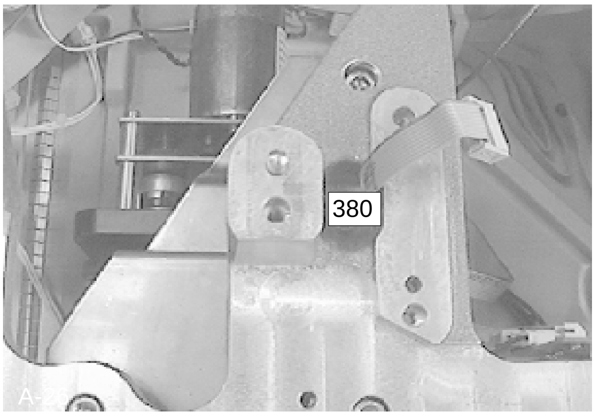
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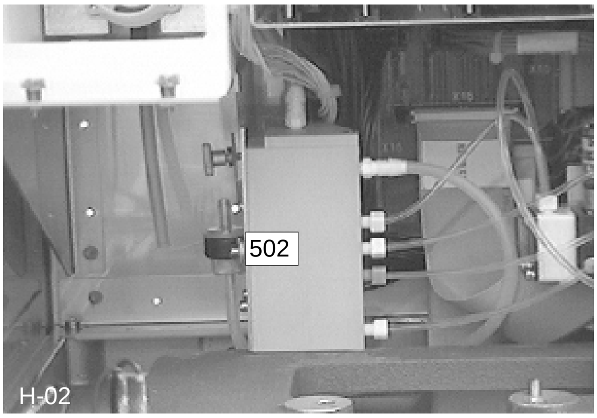
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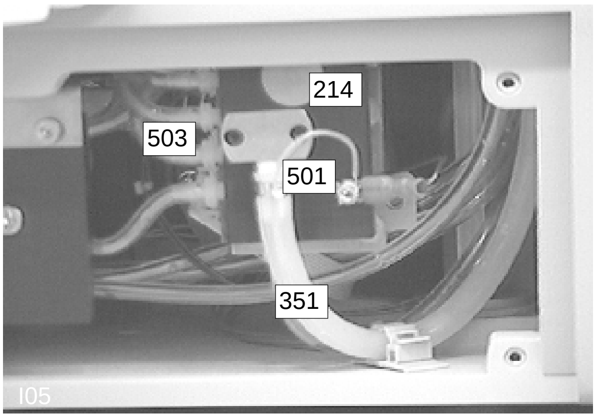
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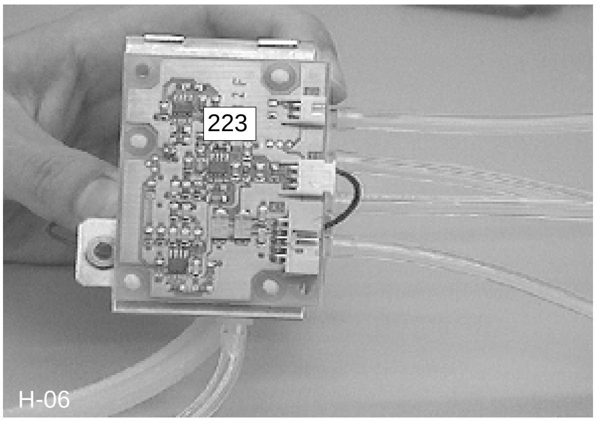
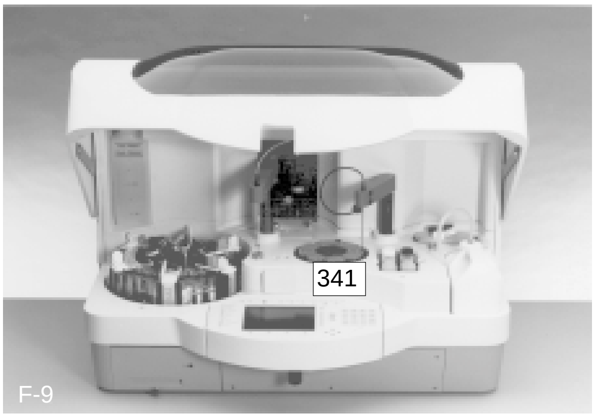

223
H-06

8.2.20 Incubator Drive

No.	ID Spare Part	Part Name English	Electronics
8	1807781001	PCB DIST ROTOR/ROTOR	BP 4
14	1801589001	FAN ASSY ELECTR. RACK/INCUBATOR	BP 4
17	1801074001	STEPPING MOTOR INCUBATOR DRIVE	BP 4
18	1801031001	PHOTO COUPLER INCUBATOR DRIVE	BP 4
19	1801031001	PHOTO COUPLER INCUBATOR DRIVE	BP 4
20	1801031001	PHOTO COUPLER INCUBATOR DRIVE	BP 4
21	1801031001	PHOTO COUPLER INCUBATOR DRIVE	BP 4
22		CABLE INCUBATOR HEATER	
41		PCB Incubator Heater BP6	
43		Heater Resistors	BP 6
44	1801368001	PHOTO COUPLER INCUBATOR SEGMENT	BP 6
48		Sensor	BP 6
148	1801520001	INCUBATION ROTOR ASSY	
150		Plate	
151		Drain hole	
153		Screw	
154	1801376001	TOOTH BELT INCUBATOR DRIVE	
340		Screw	
341		Incubator Drive	
501		O-Ring Waste	
502	1406531001	Filter CT Wash system SET2	
503	1804162001	Tubing for Waste Pump, 4pcs	
507		Plug	
508	1802259001	Cable Incubator Heater	
521	1802585001	CABLE R 2	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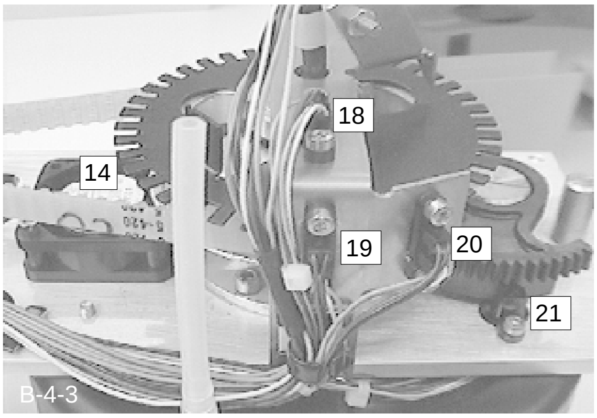
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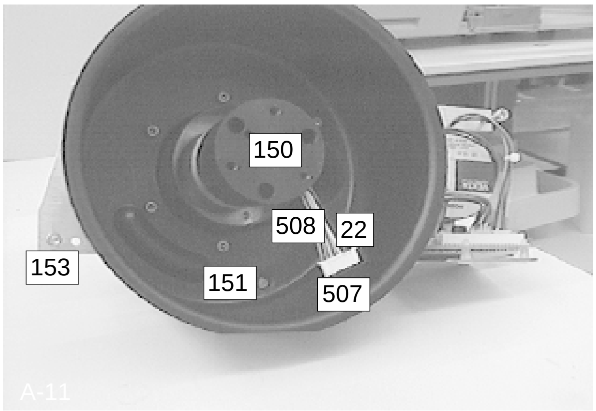
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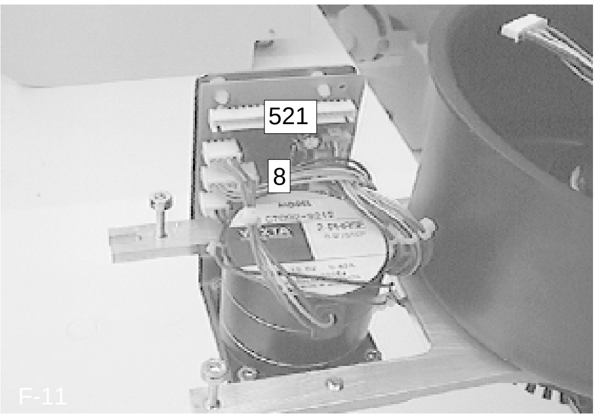
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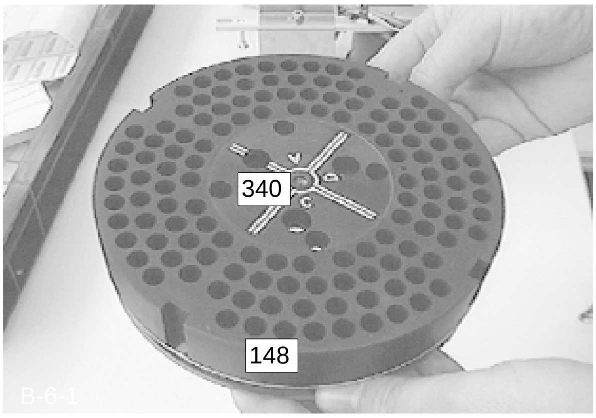
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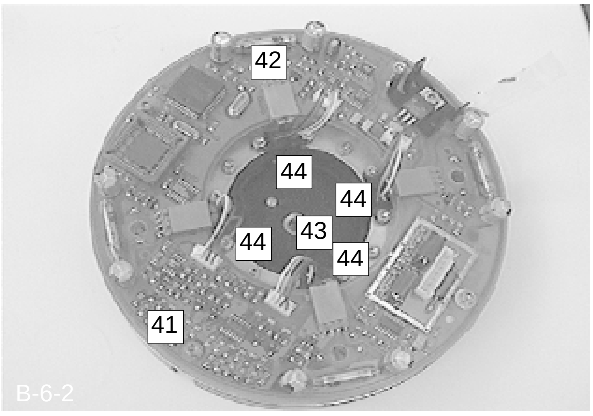
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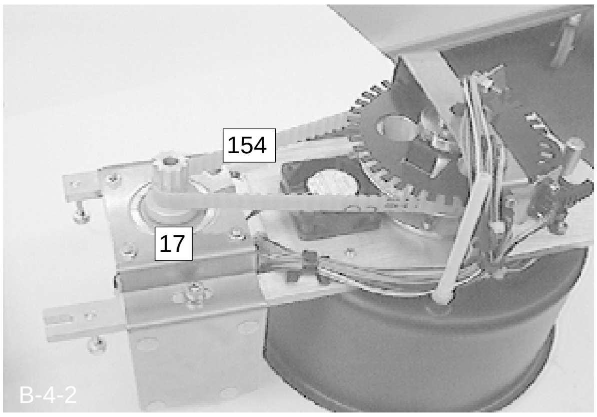
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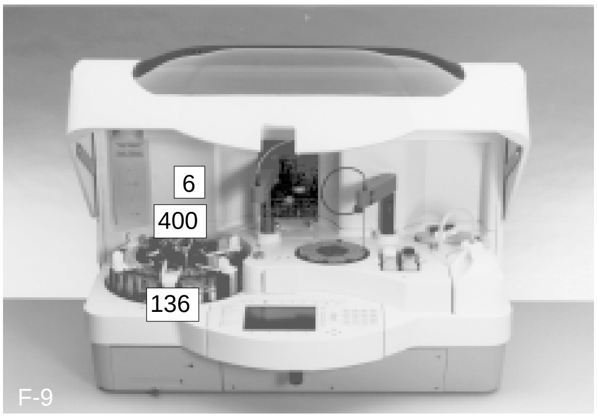
B-4-2

8.2.21 Sample Rotor Drive

No.	ID Spare Part	Part Name English	Electronics
6	1801147001	PCB ROTOR/ROTOR MODULE B4	BP 4
7	1807781001	PCB DIST ROTOR/ROTOR	BP 4
10	1801082001	STEPPING MOTOR S/R DRIVE	BP 4
11	1801040001	PHOTO COUPLER S/R DRIVE	BP 4
12	1801040001	PHOTO COUPLER S/R DRIVE	BP 4
13	1801040001	PHOTO COUPLER S/R DRIVE	BP 4
15	1801023001	FAN ASSY S/R DRIVE	BP 4
16	1801015001	PHOTO COUPLER S/R TRAY	BP 4
125	1801350001	BCR ASSY	OEM Master
136		Sample Rotor Drive (S/R Drive)	
138	1802674001	SPRING S/R DRIVE	
139	180127901	TOOTH BELT S/R DRIVE	
140	1801503001	S/R ROTOR ASSY	
141		Retaining Plate	
142		Screw	
400	1801619001	PCB CONTROLLER	
415	1802046001	PLASTIC HOUSING S/R ROTOR	
520	1802577001	CABLE R 1	



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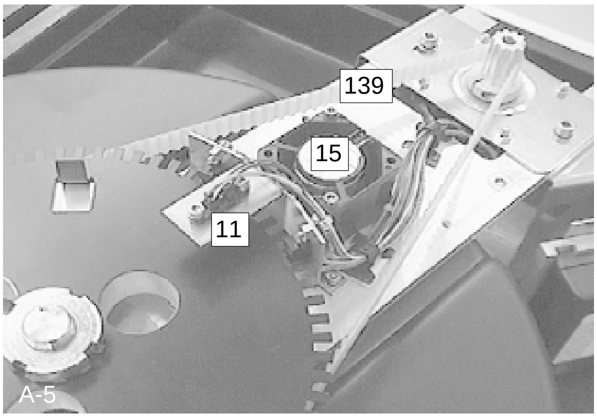

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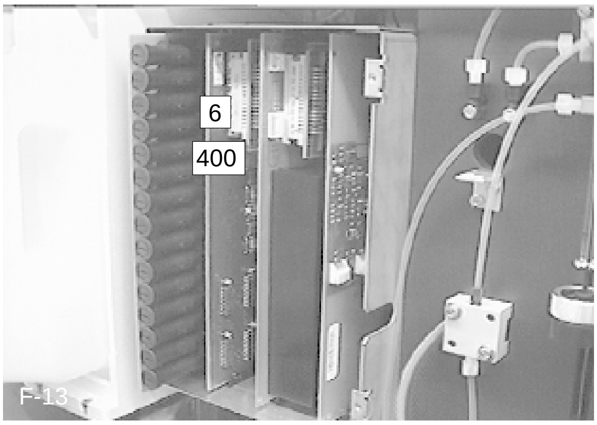

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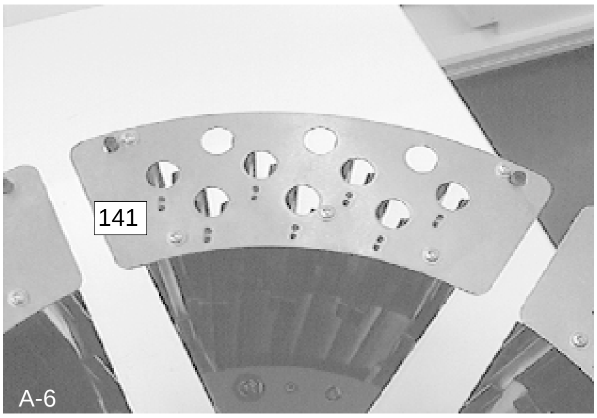

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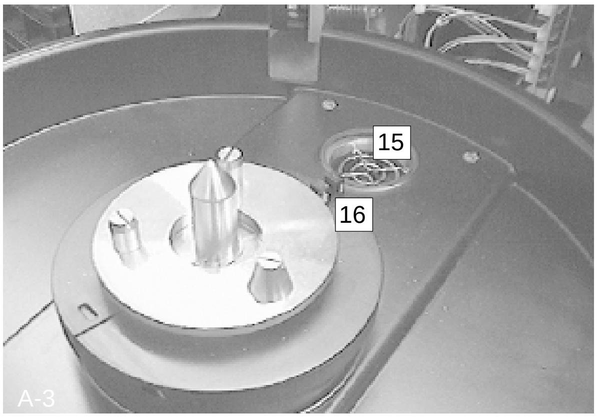

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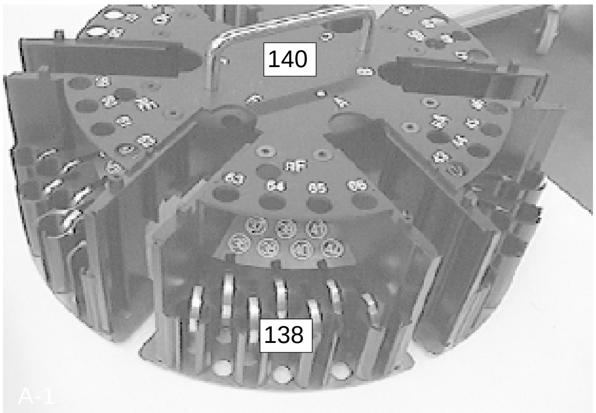

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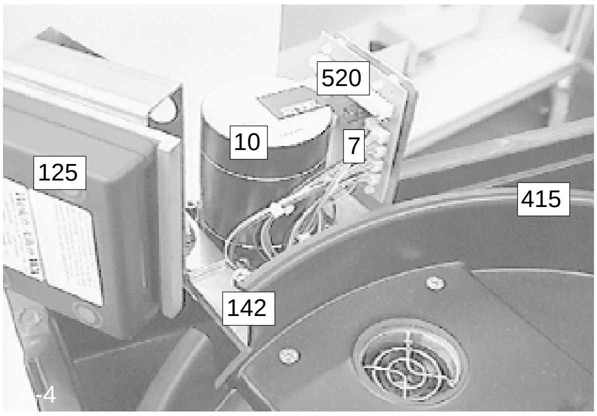
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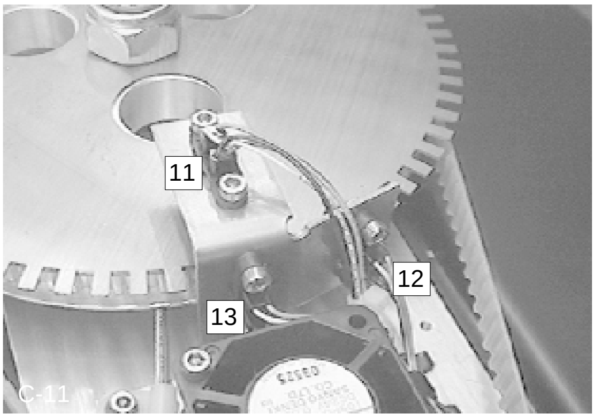
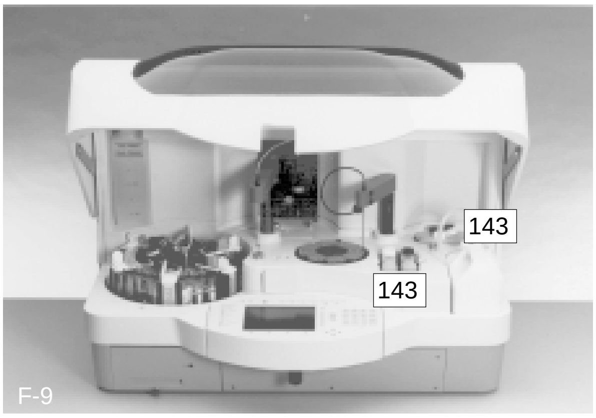
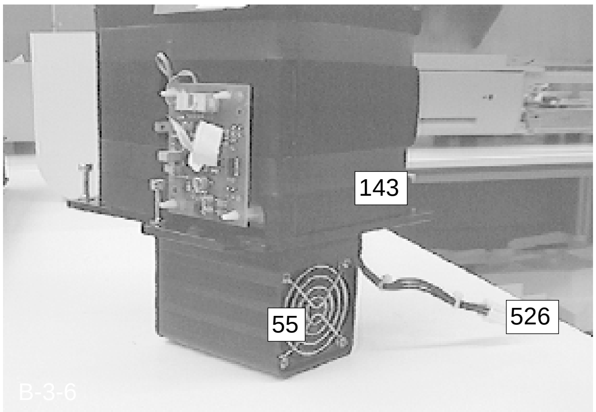


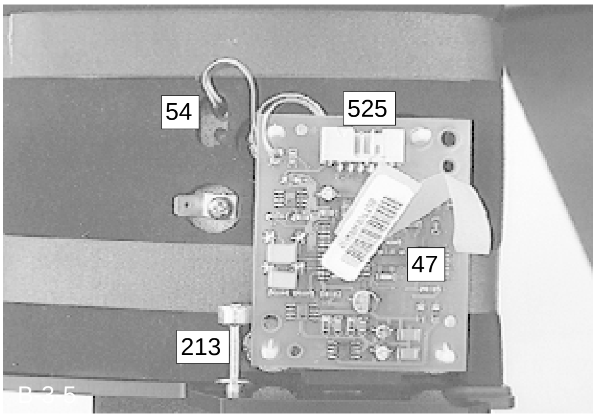
C-11

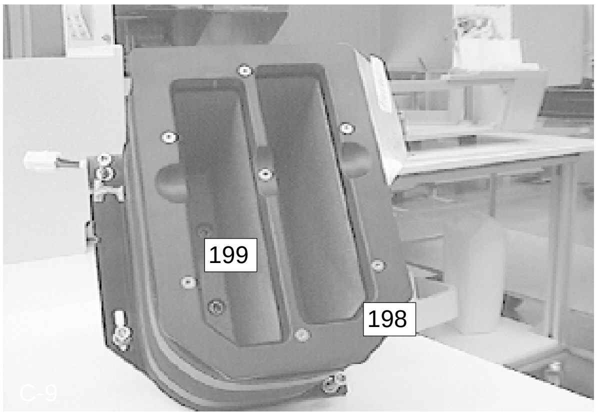
8.2.22 Bottle Temperature Assy

No.	ID Spare Part	Part Name English	Electronics
3	1802275001	Adhesive for Temperature Sensor	
47	1807749001	PCB PREAMP TEMPERATURELP	BP 3
54		Sensor	BP 3
55		PELTIER ASSY BOTTLE TEMP	BP 3
143	1801511001	BOTTLE TEMPERATURE ASSY	
198	1801252001	TOP PLATE BOTTLE TEMP	
199	1801163001	BOTTLE HOUSING	
213		Screw	
525	1802534001	CABLE T1	
526	1802542001	CABLE T 2	
Set 4		ADHESIVE FOR TEMP SENSOR	



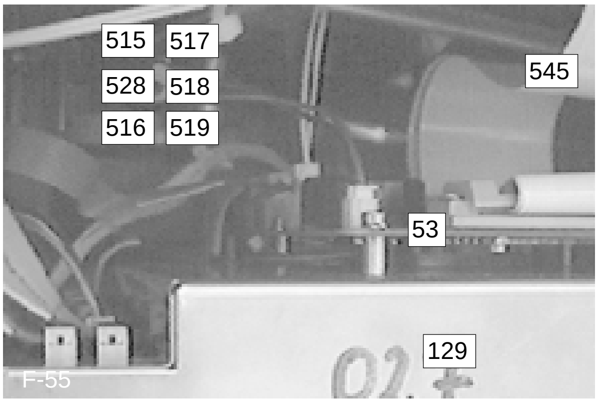


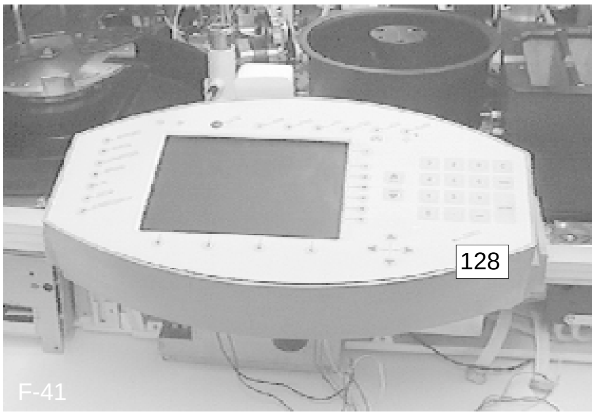


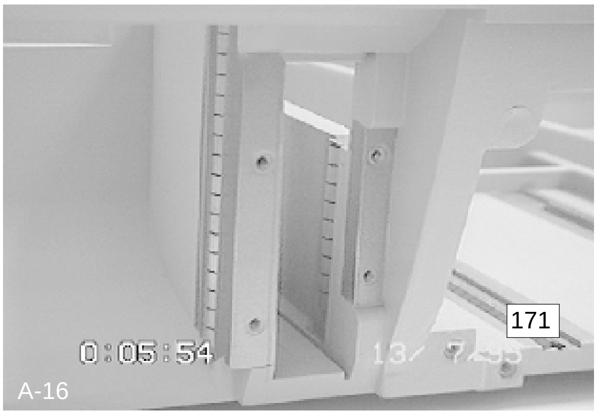


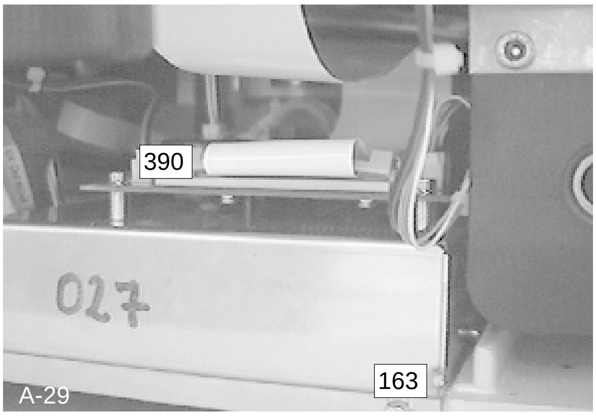
8.2.23 OEM Master

No.	ID Spare Part	Part Name English	Electronics
49		Speaker	OEM Master
50		Fan	OEM Master
53	1807846001	PCB DIST KEYBOARD	OEM Master
128	1801490001	KEYBOARD ASSY	OEM Master
129	1901788001	PCB OEM MASTER	OEM Master
163		Screw	
171	1802178001	GROUNDING CONTACT SET	
390		Strain Relief	
515	1802461001	CABLE PC 10	
516	1802399001	CABLE PC 2	
517	1802445001	CABLE PC 8	
518	1802429001	CABLE PC 6	
519	1802330001	CABLE PC 3	
528	1802348001	CABLE PC 1	
545	1907638001	Flat Cable set Keyb. OEM Master	
	1907433001	Battery for OEM Master	


515
517
545
528
518
516
519
53
129
F-55

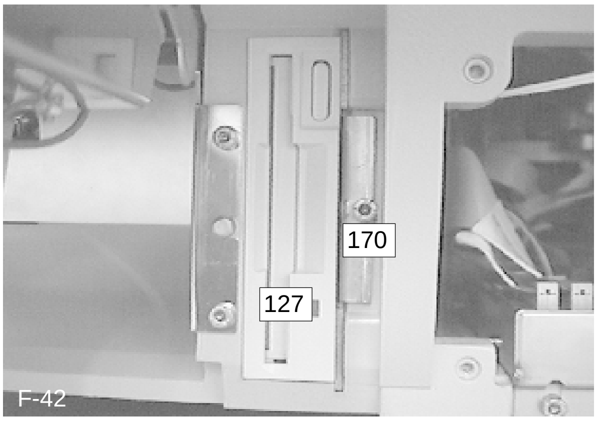


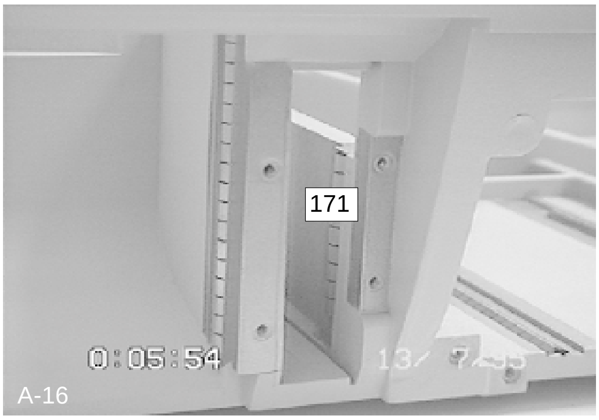

0:05:54
171
A-16



8.2.24 Floppy Drive

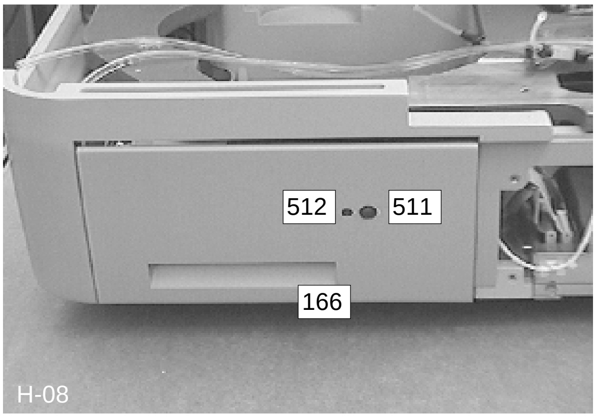
No.	ID Spare Part	Part Name English	Electronics
127	1801139001	FLOPPY DRIVE	OEM Master
170		Screw	
171	1802178001	GROUNDING CONTACT SET	





8.2.25 Printer

No.	ID Spare Part	Part Name English	Electronics
126	1801635001	PRINTER	OEM Master
166	1800949001	PLATE PRINTER	
168		Screw	
171	1802178001	GROUNDING CONTACT SET	
511		Diffusion Disk	
512		Key Button	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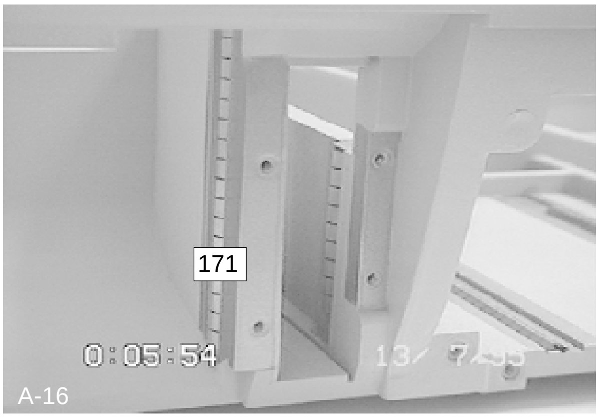
511
166
H-08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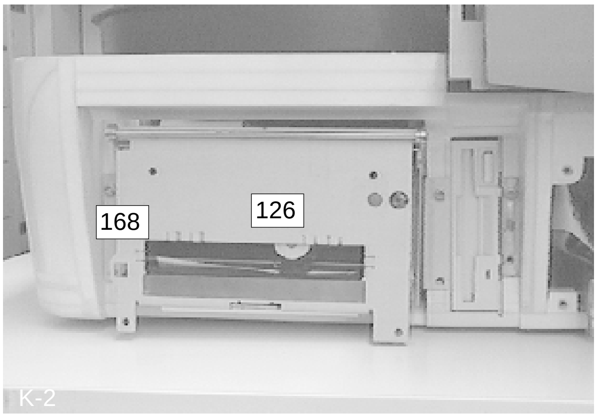
A-16



8.3 Complete Spare Part List

ID Spare part	Partname	BTO	R	A	ABC	Reference No.
1905333001	ADAPTER f. RESTRICTOR TUBING				A	
1802275001	ADHESIVE FOR TEMP SENSOR				A	3
1804979001	AIRFILTER				B	
1801341001	ARM S/R				C	181
1802305001	ARM SIPPER				C	188
1800906001	ASSAY CUP 1x4 ELECSYS 1010				A	
1706829001	ASSAY CUP ELECSYS 1010				A	
1809067001	BARCODE ADJUSTMENT LABEL				B	
1906992001	BARCODE READER CPL.				A	125
1907433001	BATTERY FOR OEM MASTER				A	
1801350001	BCR ASSY		R	A	B	125
1709968001	BEADMIXER				A	184
1802623001	BEARING KEYBOARD				C	176
1904671001	BNO SLIDER UPGRADE KIT				A	
1801163001	BOTTLE HOUSING				C	199
1801511001	BOTTLE TEMPERATURE ASSY	BTO		A	C	143
1905317001	BUFFER TANK				B	543
1802267001	CABLE (MFA)				A	388
1802291001	CABLE D6				B	513
1802283001	CABLE D61				B	212
1802470001	CABLE FL1				B	514
1802259001	CABLE INCUBATOR HEATER				A	508 / 507
1802569001	CABLE M9				B	338
1802372001	CABLE NT 1				B	529
1802348001	CABLE PC 1				B	528
1802461001	CABLE PC10				C	515
1802399001	CABLE PC2				B	516
1802330001	CABLE PC3				B	519
1802429001	CABLE PC6				B	518
1802445001	CABLE PC8				B	517
1802453001	CABLE PC9				C	424
1801686001	CABLE PREAMP SIPPER				B	186
1802577001	CABLE R 1				B	520
1802585001	CABLE R 2				B	521
1802593001	CABLE R 3				B	522
1802321001	CABLE S5				B	523
1802313001	CABLE S51				B	524
1802232001	CABLE SET DETECTION MODULE SET 1				B	314 / 315 / 317 / 527
1802534001	CABLE T1				B	525
1802542001	CABLE T2				B	526
1812041001	CAP TWIST				B	
1801236001	CONTACT NEEDLE				A	91
1800183001	COVER (EMPTY) OP. MANUAL				C	
1802682001	COVER INSERT BEADMIXER				B	401
1802496001	COVER INSIDE	BTO			C	362
1801317001	COVER S/R ARM				B	245
1800957001	COVER SIPPER ARM				B	203
1808842001	DATASWITCH FOR PROT.CONV.				B	
1801597001	DILUTOR ASSY S/R		R	A	C	193
1801155001	DILUTOR ASSY SIPPER		R	A	C	194
1802224001	DOS TUS SOFTWARE				A	
1802216001	EN 45001 SERVICE KIT				A	
1902938001	EXTENSION PACKAGE F. PROT. CONV				B	
1801589001	FAN ASSY ELECTR. RACK / INCUBATOR				B	352 / 14
1801805001	FAN ASSY INSTRUMENT BASE				B	208
1801023001	FAN ASSY S/R DRIVE				B	15
1406531001	Filter CT Wash system SET 2				A	502

Fig. 8-3s1

ID Spare part	Partname	BTO	R	A	ABC	Reference No.
1802208001	FLANGE KIT FOR TUBINGS				A	
1907638001	FLAT CABLE SET KEYB. OEM MASTER					545
1801139001	FLOPPY DRIVE				B	127
1797182001	FRIDGE FRAME				B	
1802194001	FUSE SET SET 7				A	509 / 510
1802186001	FUSEHOLDER SET 3				A	422
1802178001	GROUNDING CONTACT SET				A	171
1802160001	HALLSENSOR (MFA)				A	405
1801309001	HOLDER BEATMIXER				B	183
1802151001	HOLDER MAGNET ASSY				A	409
1802143001	HOLDER PHOTO COUPLER MD1				A	326
1801325001	HOLDER SIPPERNEDLE				A	182
1802526001	HOUSING FLAP				C	407
1802704001	HOUSING LIFTING SPRING				C	354
1802500001	HOUSING PRESSURE SENSOR				B	74
1801520001	INCUBATION ROTOR ASSY		R	A	C	148
1801546001	INSERT WASHSTATION B				B	218
1801554001	INSERT WASHSTATION D1/D2/S				B	402 / 215
1801848001	INSTRUMENT BACK ASSY	BTO			C	205
1801830001	INSTRUMENT BASE ASSY	BTO			C	204
1801694001	INSTRUMENT COVER TOP	BTO			C	359
1801775001	INSTRUMENT FEED				C	206
1802488001	INSTRUMENT HOUSING TOP	BTO			C	360
1903209001	JUSTAGE TOOL BNO				C	
1801490001	KEYBOARD ASSY		R	A	B	128
1801201001	KEYBOARD HOUSING				C	174
1801198001	KEYBOARD MOUNTING PLATE				C	175
1802127001	KEYBOARD SLIDER				B	414
1874888001	KURZBEDIENUNG ELECSYS 1010 VL				B	
1802615001	MAGNET KEYBOARD				B	72
1801007001	MAGNETVALVE ASSY VAD2/VAB1			A	A	32 / 391
1800981001	MAGNETVALVE TRIPPLE B1/D2/D1			A	A	27 / 28 / 29
1802437001	MAGNETVALVE VAS1/VM1			A	A	26 / 114
1800990001	MAGNETVALVE VWS1			A	A	30
1800523001	MAIN CABLE UL/CSA				B	
1800515001	MAIN CABLE VDE				B	
1802119001	MAINTENACE KIT				A	
1906941001	MAINTENANCE KIT EL 1010 SET 2				A	371 / 506 / 504 / 501 / 502 / 503
1706683001	MEASURING CELL EL 1010 W. REF. ELEC.		R	A	A	323
1800965001	MEMBRANPUMP PWS/PWD			A	B	23 / 25
1801643001	MFA ASSAY		R		B	209
1802712001	MFA HOUSING INSERT				B	366
1801856001	MICROSWITCH				A	353 / 355
1902946001	MOD-KIT A				C	
1902954001	MOD-KIT B				C	
1902962001	MOD-KIT C				C	
1801759001	MOTOR ASSY BEADMIXER			A	B	93
1801066001	MOTOR MAGNET DRIVE			A	B	325
1801333001	NEEDLE HOLDER				B	244
1805045001	NEEDLE S/R				A	185
1805037001	NEEDLE SIPPER				A	189
1804952001	O-RING SET WASHSTATION SET 2				A	504 / 505
1705296001	OP.MANUAL ELECSYS 1010 engl.				A	
1705288001	OP.MANUAL ELECSYS 1010 germ.				A	
1800540001	OPERATOR SOFTWARE				A	
1807862001	PCB CLOT DETECTION MODULE B7			A	B	73

Fig. 8-3s2

ID Spare part	Partname	BTO	R	A	ABC	Reference No.
1801619001	PCB CONTROLLER		R	A	B	400
1807889001	PCB DETECTION MODULE B1			A	B	320
1802097001	PCB DILUTOR REAGENT BP5		R	A	A	76
1802089001	PCB DILUTOR SAMPLE BP2		R	A	A	97
1807838001	PCB DIST DETECTION MODULE				B	322
1807897001	PCB DIST FLUID				B	408
1807846001	PCB DIST KEYBOARD				B	53
1802062001	PCB DIST MFA			A	A	385
1807781001	PCB DIST ROTOR/ROTOR				B	8 / 7
1807854001	PCB DIST VOLTAGE			A	B	4
1807811001	PCB LLD S/R				B	78
1807790001	PCB LLD SIPPER				B	100
1809059001	PCB MOTHERBOARD			A	B	2
1901788001	PCB OEM MASTER		R	A	B	129
1807765001	PCB POTENTIOSTAT / MOTOR			A	B	318
1807757001	PCB PREAMP HIGH VOLTAGE			A	B	310
1807803001	PCB PREAMP LLD S/R				B	79
1807820001	PCB PREAMP LLD SIPPER				B	101
1807749001	PCB PREAMP TEMPERATURE				B	40 / 47
1801147001	PCB ROTOR/ROTOR MODULE B4			A	B	6
1807773001	PCB TEMP MODULE B3			A	B	46
1807919001	PCB WASTE LEVEL				B	223
1801244001	PELTIER ASSY BOTTLE TEMP:			A	B	55
1801287001	PELTIER ASSY DETECTION MODULE			A	B	301
1801295001	PELTIER ASSY PREHEATER			A	B	302
1801031001	PHOTO COUPLER INCUBATOR DRIVE				A	18 / 19 / 20 / 21
1801368001	PHOTO COUPLER INCUBATOR SEGMENT				A	44
1802607001	PHOTO COUPLER KEYBOARD				A	71
1801040001	PHOTO COUPLER S/R DRIVE				A	11 / 12 / 13
1801015001	PHOTO COUPLER S/R TRAY				A	16
1802054001	PHOTOMULTIPLIER		R	A	B	121 / 309 / 312
1802364001	PHOTOSENSOR DILUTOR				A	211 / 423
1904680001	PINCH TUBING				A	544
1904680001	PINCH TUBING EL 1010				B	
1802402001	PINCH VALVE VAD1			A	A	115
1901729001	PISTON F. SYRING 250 µL				B	
1222198001	PISTON F. SYRING 2500 µL				A	
1802046001	PLASTIC HOUSING S/R ROTOR				B	415
1800949001	PLATE PRINTER				C	166
1801058001	POWER SUPPLY ASSY		R	A	B	1
1804545001	PREAMPLIFIER				C	
1801627001	PREHEATER SIPPER			A	A	306
1801821001	PRESSURE SENSOR ASSY				B	75
1801635001	PRINTER			A	B	126
1807285001	PROTOCOL CONVERTER		R		A	
1901583001	PUMP HEAD F. PWS/PWD				B	
1802038001	PUMP SAMPLE DILUTOR			A	A	235
1800558001	REF. DATE DISC				A	
1709950001	REFERENCE ELECTRODE				A	323
1905325001	RESTRICTOR TUBING				A	541
1801503001	S /R ROTOR ASSY			A	C	140
1802020001	SCREW SET				A	
1800094001	SCREW SET CELL				A	
1906950001	SCREW SET EL 1010				A	144 / 163 / 168 / 170 /246 / 304 / 305 / 307 / 330 / 333 / 334 / 339 / 367 / 368 / 373
1806262001	SECUNDAR CUP ADAPTER (6PCS)				A	

Fig. 8-3s3

ID Spare part	Partname	BTO	R	A	ABC	Reference No.
1802011001	SERVICE MANUAL EL1010				A	
1802003001	SERVICE SW incl. Description				A	
1705270001	SHORT GUIDE ELECSYS 1010 engl.				A	
1705261001	SHORT GUIDE ELECSYS 1010 germ.				A	
1801228001	SPRING				A	192
1802518001	SPRING HOLDER				A	234
1802674001	SPRING S/R DRIVE				A	138
1801171001	STAT HOLDER				C	173
1801074001	STEPPINGMOTOR INCUBATOR DRIVE			A	A	17
1801996001	STEPPINGMOTOR PK 244 (MFA)			A	A	384
1801988001	STEPPINGMOTOR PX 244 (MFA)			A	A	383
1801082001	STEPPINGMOTOR S/R DRIVE			A	A	10
1801970001	STEPPINGMOTOR Z29 (DILUTOR)			A	A	236
1801961001	STEPPINGMOTOR Z30 (DILUTOR)			A	A	237
1801813001	SWITCH SIPPER				A	113 / 220
1709801001	SYRINGE S/R				A	230
1709828001	SYRINGE SIPPER				A	195
1709615001	THERMO PRINTER PAPER (5 PCS.)				A	
1801953001	TOOTHBELT (MFA)				A	386
1801937001	TOOTHBELT 125 DILUTOR				A	425
1801945001	TOOTHBELT 87 DILUTOR				A	426
1801376001	TOOTHBELT INCUBATOR DRIVE				A	154
1801279001	TOOTHBELT S/R DRIVE				A	139
1801252001	TOP PLATE BOTTLE TEMP:				C	198
1801180001	TUBE HOLDER STAT				C	172
1901796001	TUBE-ADAPTOR				B	
1802658001	TUBING CELL 0.8				A	411
1906976001	TUBING DILUTOR S/R				B	
1802666001	TUBING S/R 1.5				A	410
1801929001	TUBING SET				A	
1906933001	TUBING SET EL 1010 SET 5				A	31 / 33 / 34 / 35 / 36 / 39 / 217 / 227
1804162001	TUBING SET WASTE PUMP SET 2				B	503
1802631001	TUBING SIPPER (1) 0.8				A	413
1802640001	TUBING SIPPER (2) 0.8				A	412
1801902001	TUBING WASTE				A	351
1800230001	VALVE BOTTLE				A	346
1801899001	VALVE DILUTOR 3-2		R	A	A	233
1801872001	VALVEMOTOR DILUTOR		R	A	A	231
1802356001	WASHSTATION B				B	219
1801562001	WASHSTATION D1/D2				B	421
1801864001	WASHSTATION S				B	216
1709771001	WASTE BOTTLE				A	361
1801104001	WASTE/WATER DISTRIBUTOR				A	214
1800973001	WASTEPUMP		R	A	A	24
1709763001	WATER BOTTLE COMP.				A	506
1801791001	WATER BOTTLE HOUSING				C	347
1801783001	WATER VALVE INSTRUMENT SIDE				A	145

Fig. 8-3s4

9 Host Interface

9.1 General

9.2 Host Interface Protocol

The connection to a host is described in a separate manual.
A test software is available to test the host connection.